UNIVERSITY OF ADELAIDE
26.3.98
LIBRARY

A Psychological Investigation of Gambling in South Australia: with particular reference to the demographic, behavioural and cognitive factors underlying regular poker/slot machine gambling

by

Paul Delfabbro (B.Ec., B.A. (Hons))

Thesis submitted for the degree of
Doctor of Philosophy, University of Adelaide, 1998

Errata

Page	Corrections Required
11 (line 26)	'...the activity does not involve the production of goods or services...'
54 (line 18)	'These response rates were then compared...'
72 (line 28)	The abbreviation GA refers to Gamblers' Anonymous.
97 (line 7)	Should be Kahneman not Kahnement
99 (line 2)	'...the longer a person holds a ticket, the more he or she will come to...'
173-174	'...7 times greater for poker machines vs. 4 times greater for racing...'
269 (line 19)	Should be '(84% losing, 13% winning, 3% break even)

Statement

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due references has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

Signed,

Department of Psychology
University of Adelaide

Acknowledgments

There are many people I would like to thank for their assistance during this project. First of all, my supervisor Tony Winefield, whose own Ph.D. work in the early 1960s provided some of the inspiration for the studies presented in Chapter 9 and 10. His patience and support during the last four years has been invaluable, and I have been very fortunate in being able to benefit from his expertise. I am hopeful that my own work will reflect many of the qualities which he has emphasised during the years I have known him; namely, the importance of clear arguments and expression, and a logical and sensible approach to the analysis and presentation of statistical information.

I am also grateful to the assistance of Vin Glenn, Vice President of the National Association for Gambling Studies (NAGS) for his encouragement and friendly advice during the last four years. Through knowing Vin and my attendance at NAGS Conferences, I have learnt a great deal-not only about other research being conducted in Australia, but also the fact that I am not the only person who scores more than 3 on the South Oaks Gambling Screen!

I would also like to thank the Adelaide Casino (Andrew McDonald-now at Jupiters in Queensland) for giving me permission to conduct a survey on Casino premises. Although this study did not turn out quite the way I had hoped, it provided me with many valuable lessons about conducting surveys; including the problems of obtaining a representative sample, and the multiplicity of ways in which people can interpret seemingly straightforward questions.

Thanks also to Margo McGregor (S.A. Hotel Association) for her assistance in locating a venue for the research reported in Chapters 8, 10 and 11, and also David Le Cornu and Justin Le Cornu for allowing me to use their tavern to conduct the study. It was a very enjoyable and interesting three months. I think I learnt more about the function and design of poker machines during that period than I did from two years of reading.

Finally, I would like to thank all the people who volunteered to act as subjects in my studies. I was very impressed with the enthusiasm, co-operation and patience which they displayed. Without these people, this project would not have been completed.

Paul Delfabbro

University of Adelaide, 1998.

Table of Contents

		page
Statement		ii
Acknowledgments		iii
List of Figures		xii
List of Tables		xiii
Abstract		xvii
Chapter 1: Project aims: gambling in South Australia		**1**
1.1	General introduction	1
1.2	The eclectic approach to gambling	2
1.3	Structure of the thesis	6
SECTION A: LITERATURE REVIEW		**9**
Chapter 2: The nature of gambling		**10**
2.1	Overview	10
2.2	Gambling: problems of definition	10
2.3	The 'connotative' meaning of gambling	11
2.4	Types of gambling: the 'denotative' definition	13
2.5	Structural characteristics of the gambling market	15
2.6	Motivations for gambling	18
2.7	The rationality of gambling	20
2.8	Summary and conclusion of Chapter 2	22
Chapter 3: General predictors of gambling involvement		**24**
3.1	Overview	24
3.2	Socio-economic status	25
3.3	Religion/moral attitudes towards gambling	26

3.4	Marital or personal status	27
3.5.1	Age Differences	28
3.5.2	Underage gambling	30
3.6	Gender and gambling: overview	31
3.6.1	Gender and gambling participation	31
3.6.2	Explanations for gender-differences	33
3.6.7	Conclusions: gender and gambling	37
3.7	Personality differences in gambling behaviour	38
3.7.1	Overview	38
3.7.2	Are gamblers sensation-seekers?	40
3.7.3	Extraversion as a predictor of gambling	42
3.7.4	Locus of control	44
3.7.5	Desirability for control (DC) scale	46
3.8	Summary of Chapter 3: predictors of gambling involvement	49

Chapter 4: Theories of gambling behaviour **50**

4.1	Overview	50
4.2	Psychoanalytic theories of gambling	51
4.3	Operant conditioning and gambling	52
4.3.1	Operant conditioning: overview	52
4.3.2	Studies of slot machine gambling	53
4.3.3	The role of incidental reinforcements	55
4.3.4	The role of near-misses in slot machine gambling	56
4.3.5	Operant conditioning and other types of gambling	58
4.3.6	Operant conditioning and superstitious behaviours	60
4.3.7	Summary and Critique: operant research	62
4.4	Classical conditioning and arousal theories	63
4.4.1	Overview	63
4.4.2	Research findings related to gambling and arousal	65
4.4.3	Are high sensation-seekers more likely to experience arousal?	68
4.4.4	Anderson and Brown's application of reversal theory	68
4.4.5	Conclusions: gambling and arousal	71

4.5	Gambling as an addiction or pathology	72
4.5.1	Overview	72
4.5.2	Gambling as a form of physiological dependence	73
4.5.3	Gambling as a psychological addiction	76
4.5.4	Gambling as a problem of impulse control	78
4.5.5	The notion of impaired control	80
4.5.6	Summary of section 4.5	82
4.6	Rational approaches to the study of gambling	83
4.6.1	Overview	83
4.6.2	The importance of chasing in gambling	84
4.6.3	The role of entrapment	86
4.7	Cognitive biases and heuristics in gambling behaviour	88
4.7.1	Introduction: the traditional approach	88
4.7.2	The 'representativeness' bias or 'gambler's fallacy'	89
4.7.3	The availability heuristic	95
4.7.4	The simulation heuristic/hindsight bias	96
4.7.5	Biased attributions in gambling: the work of Gilovich	100
4.7.6	Attributional processes in real-life gambling	103
4.8	The illusion of control	105
4.8.1	Overview	105
4.8.2	Experimental investigations of the illusion of control	106
4.8.3	A critique of illusion of control research	108
4.8.4	Insights from learned-helplessness research	111
4.8.5	Recent approaches to studying gambling-related cognitions: the 'speaking aloud' method	112
4.9	Cognitive approaches to gambling: conclusions	115

SECTION B: SURVEY STUDIES OF GAMBLING **117**

Chapter 5: Study 1: Community gambling patterns 118

5.1	Introduction to survey study 1	118
5.1	Overview	118

5.2	The South Australian gambling market	118
5.2.1	Range of gambling products	118
5.2.2	Gambling expenditure	121
5.3	Assessing the prevalence of gambling problems	121
5.3.1	Overseas research	121
5.3.2	Australian research	123
5.4	Hypotheses	124
5.4.1	Demographic differences	124
5.4.2	Variations in relation to gambling activities	125
5.4.3	Statewide comparisons	125
5.5	Methodology	126
5.5.1	Subjects	126
5.5.2	General survey design	126
5.6	Results	127
5.6.1	General involvement in gambling activities	127
5.6.2	Involvement in each of the 12 activities	128
5.6.3	Frequency of involvement in each activity	128
5.6.4	Gender differences in participation	129
5.6.5	Age differences in participation rates and frequency of gambling	132
5.6.6	Participation levels and frequency of gambling in relation to current work status	136
5.6.7	Participation and frequency of gambling in relation to the type of occupation	138
5.6.8	Participation and frequency of gambling for people not involved in any formal/paid employment	141
5.6.9	Participation and frequency of gambling in relation to annual household income	143
5.6.10	Participation and frequency of gambling in relation to person/ marital status	148
5.7	Overall best predictors of gambling involvement	151
5.8	General structure of the gambling market in South Australia	155
5.9	General Discussion	156

Chapter 6: Study 2: Social and economic effects of gambling in South Australia **160**

6.1 Overview 160
6.2 Estimates of gambling expenditure 160
6.3 Total amount spent on gambling activities per week 161
6.4 Levels of expenditure on each of the twelve gambling activities 162
6.5 Amount spent on each activity (per session) 163
6.6 Demographic differences in gambling expenditure 163
6.7 Discussion:gambling expenditure in South Australia 166
6.8 Gambling-related problems in South Australia 167
6.9.1 Gambling problems in relation to the type of gambling 171
6.9.2 Discussion: gambling problems and gambling activities 174
6.10.1 Gambling problems in relation to demographic characteristics 176
6.10.2 Discussion: gambling problems and demographic characteristics 177
6.11.1 The prevalence of gambling in South Australia 180
6.11.2 Discussion: the prevalence of gambling problems 181
6.12 General discussion and methodological criticisms 182

Chapter 7: Study 3: Age and Gender Differences in Gambling **185**

7.1 Overview 185
7.2 Aims and predictions of study 187
7.3 Method 189
7.3.1 Subjects 189
7.3.2 Subject recruitment 189
7.3.4 Questionnaire 190
7.4 Results 192
7.4.1 Gambling Involvement 192
7.4.2 Gender and age differences in involvement 193
7.4.3 Perceptions of activities 197
7.4.4 Gender and age differences in skill ratings 198
7.4.5 Reasons for avoiding skilled activities 204
7.4.6 Motivations for gambling 206.

7.4.7 The use of skill and luck in gambling 207
7.4.8 Reasons for persisting when losing 209
7.5 Discussion 212

SECTION C: POKER MACHINE GAMBLING IN S. AUST. 220

Chapter 8: Study 4: Poker machine gambling: a survey study 221

8.1 General introduction 221
8.2 Description of study 4 222
8.3 Method 226
8.3.1 Subjects 226
8.3.2 Questionnaire 226
8.4 Results 227
8.4.1 Gambling involvement 227
8.4.2 Motivations for gambling 228
8.4.3 Perceived skill in poker machine gambling 231
8.4.4 Mood states associated with playing poker machines 233
8.5 Discussion 235

Chapter 9: Study 5: Within-session characteristics of poker machine gambling (a laboratory study) 240

9.1 Overview 240
9.2 Rationale of poker machine study 2 243
9.3 Method 246
9.3.1 Subjects 246
9.3.2 Apparatus 247
9.3.3 Procedure 247
9.4 Results 248
9.4.1 Session characteristics 248
9.4.2 Response rate differences 249
9.4.3 Expectancy of winning 250

9.5 Discussion 254

Chapter 10: Study 6: Within-session characteristics of poker machine gambling (a field study) 259

10.1 Introduction to poker machine study 3 259
10.2 Method 261
10.2.1 Subjects 261
10.2.2 Apparatus 262
10.2.3 Procedure 262
10.2.4 Post-experimental analysis 264
10.3 Results 264
10.3.1 Session characteristics 264
10.3.2 Response rate variations 265
10.3.3 Analysis of expectancy data 267
10.3.4 Variations in the amount staked per turn 268
10.4 Discussion 270

Chapter 11: Study 7: Irrational-thinking and cognitive biases in regular poker machine gambling 278

11.1 Introduction to poker machine study 4 278
11.2 The validity of speaking-aloud studies 280
11.3 Method 282
11.3.1 Subjects 282
11.3.2 Apparatus 282
11.3.3 Procedure 283
11.3.4 Instructions 284
11.3.5 Post-experimental analysis 284
11.4 Results 285
11.4.1 Session characteristics 285
11.4.2 Classification of verbalisations 286
11.4.3 Level of irrational thinking 288
11.4.4 Percentage of wins and irrationality 289

11.4.5 Risk-taking and irrationality 289
11.4.6 Types of irrational verbalisations 290
11.4.7 Evidence of cognitive biases: qualitative examples 290
11.5 Discussion 292

Chapter 12: Summary and Conclusions 303

12.1 Overview 303
12.2 Gambling participation in South Australia 303
12.3 Problem gambling in South Australia 306
12.4 Motivations for gambling 308
12.5 The within-session characteristics of poker machine gambling 309
12.5.1 The role of operant conditioning 310
12.5.2 The role of cognitive processes 312

References 316
Appendix A: Article 1: based upon Chapter 10 344
Appendix B: Article 2: based upon Chapter 11 369
Appendix C: Community gambling survey used in chapters 5 and 6 396
Appendix D: Scoring the SOGS and recoding of demographic categories used in Chapter 5 and 6 411
Appendix E: Casino gambling survey used in Chapter 7 414
Appendix F: Gambling survey used in Chapter 8 421
Appendix G: Instructions and score sheets used in Chapter 9 426
Appendix H: Instructions used in Chapter 10 429
Appendix I: Verbalised statements recorded in poker machine study 4 431

List of Figures

		page
Figure 1.1	A multi-level approach to the study of gambling	4
Figure 2.1	Gambling activities categorised according to interval length and level of involvement	17
Figure 4.1	Example of a 'near-miss' and a 'scatter win' on a 5-reel machine	58
Figure 5.1	Percentage of people in total sample participating in each type of gambling activity	128
Figure 5.2	Percentage of men and women involved in each activity	130
Figure 5.3	Participation in each activity in relation to age-group	133
Figure 5.4	Participation in each activity in relation to work-status	137
Figure 5.5	Participation in each activity in relation to type of work	139
Figure 5.6	Participation in relation to 'non-worker' status	141
Figure 5.7	Participation in each activity in relation to household income	145
Figure 5.8	Participation in each activity in relation to marital status	149
Figure 6.1	Mean (median) amount of money spent on each activity	164
Figure 6.2	Comparison of the South Australian prevalence rate with other recent statewide figures	180
Figure 7.1	Percentage of casino patrons participating in each activity during the previous 12 months	193
Figure 7.2	Participation rates for men and women in the Casino sample	194
Figure 7.3	Percentage of respondents providing a perceived or personal skill rating of 4 or more for each activity	198
Figure 9.1	Method of analysing expectancy changes	252

List of Tables

		page
Table 2.1	Structural characteristics of several common types of gambling available in South Australia	14
Table 3.1	Summary of Chapter 3: predictors of gambling involvement	49
Table 5.1	Activities available in South Australia 1996-1997	119
Table 5.2	Percentage of gamblers on each activity who participated monthly, or less often	129
Table 5.3	Gender differences in the frequency of gambling on each activity	131
Table 5.4	Percentage of people in each age-group who gambled at least once per month on the 12 activities	135
Table 5.5	Percentage of people in each work-status category who gambled at least once per month on the 12 activities	138
Table 5.6	Percentage of people in each occupational group who gambled at least once per month on the 12 activities	140
Table 5.7	Percentage of people in each 'non-worker' category who gambled at least once per month on the 12 activities	143
Table 5.8	Percentage of people in each household income category who gambled at least once per month on the 12 activities	147
Table 5.9	Percentage of people in each personal status category who gambled at least once per month on the 12 activities	151
Table 5.10	Logistic regression: demographic predictors of gambling involvement	153
Table 5.11	Factor analysis of gambling participation scores	155
Table 6.1	Mean (median) total amount outlayed per week and year on gambling	162
Table 6.2	Percentage of gamblers in each annual expenditure category	163
Table 6.3	Demographic differences in mean weekly expenditure	165
Table 6.4	Percentage of people who scored on each of the 20 SOGS items	169
Table 6.5	General problems associated with gambling	171

Table 6.6a	Gambling problems (SOGS) in relation to type of gambling	172
Table 6.6b	Gambling problems (PSE) in relation to type of gambling	173
Table 6.7a	Logistic regression: specific problems associated with different types of gambling	175
Table 6.7b	MRA (standard) of gambling problems as predicted by type of activity	176
Table 6.8	Gambling-related problems in relation to demographic characteristics	178
Table 7.1	Logistic regression: predictors of gambling involvement in sample of Casino gamblers	195
Table 7.2	Mean perceived and personal skill ratings provided for each activity	197
Table 7.3	Hierarchical multiple regression analysis of perceived skill ratings in relation to age and gender	200
Table 7.4	Hierarchical multiple regression analysis of personal skill ratings in relation to age and gender	202
Table 7.5	Reasons given for not playing blackjack (the most popular skilled game)	204
Table 7.6	Gender differences in explanations given for not playing blackjack	205
Table 7.7	Motivations for gambling in relation to gender and age	206
Table 7.8	Multiple regression analysis of motivations for gambling	207
Table 7.9	Gender and age differences in the use of skill and luck in gambling	208
Table 7.10	Logistic regression analysis of gambling beliefs and behaviours	210
Table 7.11	Multiple regression analysis of cognitive explanations for persistence	211
Table 8.1	Gambling involvement in relation in gender and group	227
Table 8.2	Motivations for playing poker machines in South Australia	229
Table 8.3	Number (%) of people rating each motivation as quite important to very important	230

Table 8.4	Comparison of motivations of South Australian poker machine players and UK fruit-machine players	230
Table 8.5a	Perceived skill ratings for poker machine gamblers in South Australia	231
Table 8.5b	Perceived personal skill ratings compared with other players	232
Table 8.6	Comparison of perceived skill ratings of South Australian and UK fruit machine players	232
Table 8.7	Comparison of personal skill ratings of South Australian poker machine players and UK fruit machine players	233
Table 8.8	Moods experienced by South Australian poker machine players before, during and after gambling	234
Table 8.9	Comparison of mood ratings for South Australian poker machine players and UK fruit-machine players	235
Table 9.1	Session characteristics for individual players	248
Table 9.2	Mean inter-response times in relation to variations in the amount won	250
Table 9.3	Mean expectancy ratings in relation to variations in the amount won	251
Table 9.4	Percentage of expectancy changes in relation to net wins and losses	254
Table 10.1	Mean session characteristics for occasional and regular players	265
Table 10.2	Mean inter-response times and expectancy levels for various levels of cash reinforcement	266
Table 10.3a	Mean percentage of expectancy increases of decreases associated with winning and losing sequences	267
Table 10.3b	Mean percentage of stake increases and decreases associated with winning and losing sequences	269
Table 10.4	Strategies used to determine whether a machine was more or less likely to pay out	275
Table 11.1	Session characteristics for regular players	285

Table 11.2	The percentage of irrational statements in individual players and in the overall sample	288
Table 11.3	Mean percentage of overall irrational and rational strategic statements in relation to gender, win percentage, and level of risk-taking	289
Table 11.4	Mean percentages of each of type of irrational statement	290

Abstract

A series of seven studies was carried out to investigate the sociological and psychological factors underlying gambling in South Australia, with a particular emphasis upon the determinants of poker machine gambling. Studies 1 and 2 involved a large community gambling survey (n=1200) conducted during 1996 to determine the prevalence of gambling and gambling-related problems in South Australia. The results showed a high level of gambling participation, with 79% of South Australians having gambled at least once during the previous 12 months, and 42% having gambled at least once on poker machines. Gambling participation was significantly related to demographic characteristics, with younger, single and employed people more likely to gamble than other segments of the population. In line with recent research by Mok and Hraba (1991) and Hraba and Lee (1995), participation in certain activities was significantly related to age and gender with younger males more likely than older people and women to gamble on casino games and racing, who tended to confine their gambling to a narrower range of activities such as poker machines, lotteries and bingo.

Furthermore, it was found, using the South Oaks Gambling Screen (Lesieur & Blume, 1987) that 1.21% of the sample could be classed as probable problem gamblers (based upon the U.S. criterion of 5 points or more). This result was generally consistent with previous Australian research (Dickerson, Baron, & O'Conner, 1994; Dickerson, Walker, & Maddern, 1995; Dickerson, Allcock, Blaszczynski, Nicholls, Williams, & Maddern, 1996). Gambling-related problems were most commonly observed in people aged 18-24 years, who were single or unemployed. Finally, although 60% of all gambling-related problems were related to poker machines in absolute terms, poker machines were no more likely than other continuous types of gambling to be associated with gambling-related problems after controlling for differences in participation.

Study 3 involved a survey of Casino patrons (n=120) and was designed to explore further the gender and age differences observed in Study 1, and also people's perceptions of, and motivations for gambling. The results revealed several additional gender and age differences. Although men reported being significantly more likely to attribute their successes to skill and to use strategies when they gambled, they did not

differ in their motivations for gambling, or in their perceptions of each activity, after controlling for differences in participation. Similarly, correlation analysis, using age, showed that younger people were significantly more likely to use skill when they gambled, and to rate 'winning money' as being of greater importance than did older people. More generally, consistent with previous research by Ladouceur and Gaboury (1988), and Walker (1992a), the results showed that most of the beliefs and behaviours reported by gamblers were irrational. Gamblers were more likely to report that their behaviour was based upon luck and superstitions than upon rational practices such as checking the odds, or obtaining information about the activities on which they were gambling.

Study 4 was the first of a series of studies which focussed specifically upon poker machine gambling. Based upon a sample of 38 regular (once per week) and 21 non-regular (less than once per week) poker machine gamblers, this study used questions previously developed by Griffiths (1993b, 1994) to examined the role of motivation, skill and mood in regular and non-regular poker machines players, and how these results compared with those obtained by Griffiths. The results were generally consistent with previous studies (e.g., Dumont & Ladouceur, 1990; Griffiths, 1995a; Walker, 1988) which have revealed multiple motives for participation including: the need for enjoyment, excitement, winning money, and escaping negative mood states. However, the results differed from those of Griffiths (1995a), with Australian players significantly less likely to experience negative mood states during gambling and to see poker machine playing as a skilful activity.

Study 5 involved a laboratory investigation of the within session characteristics of poker machines gambling, including response rate variations in relation to variations in reinforcement and expectations of winning. Twenty-four non-regular players were observed gambling on a poker-machine for sessions of between 25 and 40 minutes. The results were only partially consistent with previous research by Dickerson, Hinchy, Legg-England, Fabre, and Cunningham (1992). Response-rate decreases were observed in relation to large wins, but no response-rate increases were observed in relation to small wins. In addition, the results provided only limited support for the idea that players' expectations of winning vary systematically in relation to outcomes. This was further confirmed in Study 6, which examined the role of behavioural events

and cognitions in an 'ecologically valid' setting. Eighteen regular and 21 occasional poker machine players were observed, using a methodology that allowed a simultaneous recording of machine events, behaviour and cognitions. The results supported previous research by Dickerson (1993), namely, that slot machine gambling is a highly disciplined, or 'stereotyped' behaviour. However, contrary to the fact that poker machines are based upon random-ratio schedules, behaviour was found to be more consistent with 'fixed-ratio responding' (Ferster & Skinner, 1957), with players in both groups showing a tendency to pause after having obtained large rewards and maintain rapid response rates in the absence of reward. Further analyses of betting behaviour showed that regular players were not only less likely to alter their stakes, but also appeared more sensitive to the nature of outcomes, with stake increases typically following wins and, decreases following losses. Finally, although confirming that expectations of winning are unrelated to behaviour or outcomes, observations revealed that many players nonetheless believed that they could 'discriminate' the conditions under which reinforcement was most likely.

Study 7 was based upon previous research by Walker (1988; 1992b), Ladouceur, Gaboury, Bujold, Lachance, and Tremblay (1991) and Griffiths (1994) which has suggested that irrational-thinking may play a central role in the maintenance of behaviour in slot-machine gambling. Consistent with Walker's (1992b) study, 75% of 'strategic' cognitions were found to be irrational; but they showed that irrational statements comprised only 14% of total cognitions. Overall, irrationality was found to be unrelated to gender, or the amount won, but was predicted by a measure of risk-taking, with greater irrationality observed in players who gambled larger stakes. The validity of the speaking-aloud method and the implications of this research for cognitive-behavioural interventions were discussed.

Chapter 1

Project Aims: Gambling in South Australia

1.1 General Introduction

In terms of annual turnover, gambling is the second largest industry in Australia after mining (O'Conner, cited by Wooton, 1995). In 1995-96, $8.26 billion dollars was lost by people gambling in Australia, an increase of over $5.5 billion since 1973 (Tasmanian Gaming Commission, 1995). Surveys conducted in Australia suggest that at least 70-80% of Australians gamble at least once per year, with at least a third of these people gambling on a weekly basis (AGB McNair, 1992; 1995; Dickerson, Baron, Hong, & Cottrell, 1996; DBM Consultants, 1995; Grichting, 1986). These studies have also shown that between 0.5% and 1.6% of adult Australians gamble excessively or experience problems as a result of their gambling (Blaszczynski, Walker, Sagris, Dickerson, 1997). This rapid growth in gambling has been linked to the increasing availability of gambling opportunities in the last decade (Casey & Morrissey, 1992; McMillen, 1995, 1996). Whereas in the past, gambling has been generally limited to activities such as horse-racing, sports-betting and lotteries, this is no longer so. Each Australian State now has a large urban casino, off-course and telephone betting, and (with the exception of Western Australia) many thousands of electronic gaming machines in suburban locations. Consequently, increasing attention has been directed towards understanding the social and economic effects which gambling is having upon the wellbeing of Australian communities.

As Dickerson et al. (1997) have pointed out, significant advances have already been made in determining the effects of gambling in many Australian States. For example, large-scale survey studies have been conducted to assess the extent of gambling participation, and gambling-related problems in Western Australia (Dickerson, Baron & O'Conner, 1994), Tasmania (Dickerson, Walker & Baron, 1994), Queensland (Dickerson, Boreham & Harley, 1995; Dickerson, Boreham, Harley, Maddern & Baron, 1995) and New South Wales (Dickerson, Allcock, Blaszczynski, Nicholls, Williams, Maddern, 1996a, b), and Victoria (AGB McNair, 1995; DBM Consultants, 1995). However, very little information is presently available to assess the effects of

gambling in the State of South Australia. Despite reports from welfare agencies that the recent introduction of poker machines to South Australian clubs and hotels in 1994 has led to a substantial increase in the number of people with gambling-related problems, no data are presently available to support these assertions. It remains unclear what percentage of people in South Australia are experiencing gambling related problems, and what factors (demographic or otherwise) appear to be associated with excessive gambling involvement. Moreover, no detailed research has been carried out to determine how often South Australians gamble, and what factors appear to be associated, not only with overall gambling participation, but also with involvement in particular activities. Finally, there has been little research which has examined why people gamble and, more importantly, why they gamble excessively. The aim of this project therefore was to address these questions.

Using a combination of survey, laboratory and experimental field research, this project was designed to continue previous Australian research which has examined the demographic and psychological factors involved in gambling behaviour. To achieve this goal, an attempt was made, wherever possible, to utilise the methodologies and measures previously employed by the Australian Institute for Gambling Research. In this way, results obtained in the present studies could be compared with the results obtained in other States. Such comparability, as Dickerson (1997) notes, is of considerable importance in gambling research if useful progress is to made in advancing theoretical knowledge and assessing the validity of existing research designs.

1.2 The Eclectic Approach to Gambling Research

In determining the most appropriate approach to researching gambling in South Australia, the researcher decided to follow the recent suggestions of Dickerson (1995) and Walker (1992a). According to these authors, research into gambling behaviour is best served by the adoption of what Brown (1986) has termed an 'eclectic approach'. Rather than assuming that gambling can be understood in terms of any single level, it is assumed that gambling must be approached from multiple perspectives. In this connection, Walker argues that the most logical approach to understanding why people gamble is to consider involvement '...as the passage of people through a filter system.'

(p. 134). This 'filter system' is depicted in Figure 1.1 and, as can be observed, it suggests that research needs to be conducted at three different levels of analysis.

The first, and most general level, consists of what might be termed 'distal' factors which attempt to explain why people are involved with gambling to start with. These factors include: (a). Cultural/Societal variables: (e.g., the general availability of gambling activities, the legality of gambling, people's social acceptance of gambling activities); (b). Reference Groups/Social Learning: such factor include the person's socio-economic status, ethnicity, gender, family and peer interest and involvement in gambling (Syme, 1996). The implication of these explanations is that gambling is probably more likely to be associated with people who live in societies that have numerous gambling opportunities. Furthermore, gamblers may be more likely to emerge from families with a history of gambling involvement, where friends gamble, or in cultures where gambling is accessible or socially acceptable given the individual's gender, age, or socio-economic status. Thus, the first stage in gambling research is to understand the nature of the general market, in particular, the characteristics of those most likely to be involved in gambling. In this way, research can be more effectively directed towards those people whose lives are most likely to be affected by gambling. As Dickerson (1995) has noted:

> Central to the schema is the assumption that we must use the data on the frequency, duration and expenditure characteristics of players for each gambling product. These basic behavioural data are assumed to be essential classificatory data for...research....within the social impact or problem gambling domain...[and in]...research into [the] psychological processes that may underlie...gambling behaviour. (p. 81)

However, as Walker (1992a) cautions, a limitation of this level of analysis is that it does not explain why one person gambles and another does not. The fact that two people may share the demographic characteristics most commonly associated with gambling involvement, does not imply that both will gamble to the same extent, or gamble at all. Thus, one needs to explain why some people gamble while others do not. Consequently, a second stage of research must be to consider the role of a second class of 'distal factors'. These factors include: people's individual knowledge of gambling, their attitudes towards gambling, or variations in personality or temperament (Walker, 1992a). The expectation here is that South Australians who choose to gamble may differ in some way from those who do not gamble. People who gamble may hold more

positive attitudes towards gambling, or have a greater desire to win money. Alternatively, they may be more convinced of the profitability of gambling, or obtain greater excitement and enjoyment from risk-taking in general. Similarly, when one considers variations in gambling involvement such attitudes and dispositions are likely to be important, since it is likely that those who gamble more heavily may hold different views or motivations than those who gamble infrequently.

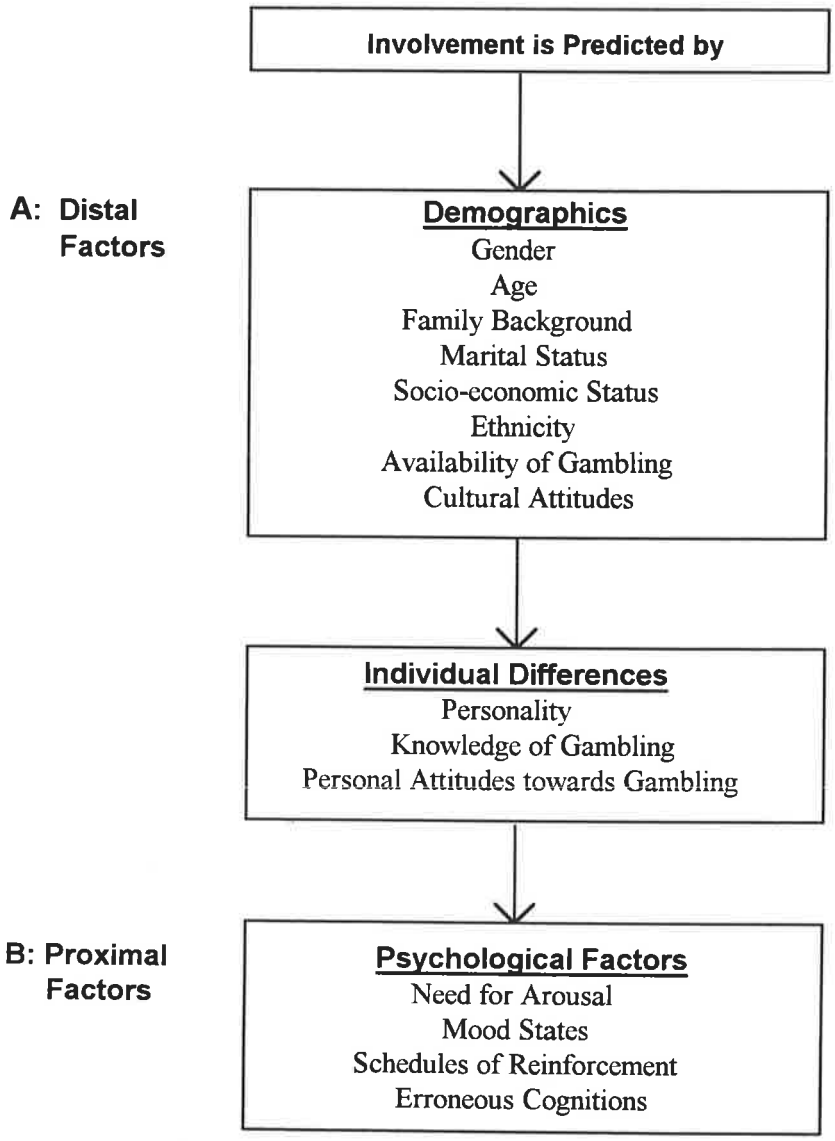


Figure 1.1 A Multi-level Approach to the study of gambling (from Walker, 1992a)

A limitation of this type of research is that it is essentially correlational in nature, and does explain a great deal about the nature of gambling itself. Thus, as Walker (1992a) argues, a final stage in the research process must be to consider what are

termed the 'proximal' causes of gambling behaviour. Termed the 'external' and 'internal' determinants of gambling behaviour by Dickerson (1993), these are the factors which increase the likelihood of the onset of a gambling session (external factors) and which are associated with the maintenance of a session once it has commenced (internal factors). Unlike 'distal' explanations of gambling which only examine which variables covary with gambling involvement, 'proximal' explanations or theories attempt to understand the social, psychological or biological processes which influence the process of gambling itself. Therefore, a further aim of this project was to conduct several separate studies of the 'proximal' causes of certain types of gambling behaviour in South Australia. By this means, survey findings relating to the groups most at risk of gambling-related problems in South Australia could be supplemented by an examination of the factors which appear to cause or maintain these excessive levels of gambling. Such information could subsequently be made available to welfare and service agencies for the development of treatment programmes suitable for assisting their clientele.

Thus, the main objectives of this project can be summarised as follows:

- *To obtain baseline data concerning gambling participation in South Australia*: How many people in South Australia gamble? How often do they gamble, and how much time and money do they spend, and are some types of gambling are more popular than others?

- *To identify the characteristics of those who gamble*: What types of people are most likely to gamble? Do some people gamble more often than others, and, if so, do the factors which predict an involvement in one type of gambling activity also predict an involvement in others?

- *To ascertain the percentage of people in South Australia are experiencing problems associated with their gambling*: What sort of problems are being experienced, and what types of people are most likely to experience these problems?

- *To examine people's motivations for, and perceptions of, gambling activities*: Do people gamble to win money, or are there other factors which account for their involvement? Do these motivations vary according to the type of person or gambling involved? Do people believe that gambling activities allow the possibility for skilful play, or do people recognise that most gambling activities are chance-determined?

- *To examine the within session characteristics of gambling behaviour*: why do people continue to gamble when they are losing money? To what extent is persistence related to the beliefs which people have about the nature of gambling activities, as opposed to their reactions to specific gambling events? Do people with greater gambling experience behave differently from those who gamble only occasionally? To what extent can understanding the behaviour of regular gamblers help to understand the behaviour of problem gamblers?

- To discuss the implications of these findings for assisting Government policy and the treatment (or education) of people who gamble excessively.

1.3 Structure of this Thesis

To address each of these issues, this thesis was divided into three sections. The first of these sections (Section A) contains a detailed review of the existing research literature relating to gambling, and was based upon Figure 1.1. Included in this section are three chapters: 2, 3 and 4. Chapter 2 provides a brief discussion of the nature of gambling, including a definition of gambling, a description of the types of activity which fall into this classification) and also what aspects of gambling make it appealing to so many people. Chapter 3, on the other hand, contains a summary of research and theories concerning the 'distal' causes of gambling behaviour, including the role of demographic, individual difference, and motivational variables as predictors of gambling involvement. This material forms the background for the studies described in Chapters 5, 6 and 7. By contrast, Chapter 4 contains a discussion of 'proximal' causes of gambling behaviour. This chapter provides a critical review of the theories which have been advanced to explain the process of gambling itself; specifically, what factors influence the onset of gambling sessions and the persistence of gambling behaviour.

This material is used as the basis for the investigations described in Chapters 8, 9, 10, and 11.

The first empirical data obtained in this project are presented in Section B. This section contains three chapters (5, 6 and 7) and describes the findings of two survey studies of the demographic and motivational correlates of gambling involvement. Chapter 5, which is based upon the first part of a large community gambling survey (n=1200) conducted in South Australia during 1996, provides details of gambling participation in South Australia, the best demographic predictors of involvement, and the general structure of the gambling market. Chapter 6, on the other hand, reports the results of the second part of this survey relating to the social and economic effects of gambling. Included in this chapter is an analysis of estimated expenditure patterns in South Australia: how much South Australians typically spend on gambling, the amount spent on each activity, and the demographic predictors of expenditure. This chapter also includes: estimates of the prevalence and incidence of problem gambling in South Australia in 1996 as estimated by the South Oaks Gambling Screen, and also what factors appear to be associated with gambling related problems. For example, although media reports have generally assumed that poker machines are the major cause of gambling-related problems in South Australia, so far this has not been confirmed empirically using a randomised survey. Finally, Chapter 7 examines peoples' motivations for, and perceptions of, gambling activities. Using a sample of 120 gamblers from the Adelaide Casino, the aim of this study was to examine the role of two variables: age and gender, both of which were found in Chapters 5 and 6 to be significant predictors of gambling involvement and gambling-related problems.

By contrast, the focus of Section C (Chapters 8, 9, 10, 11) is more specific. In this section, the results of four studies of poker machine gambling are reported. The first of these, described in Chapter 8, presents the results of small survey study which compares the motivations and perceptions of regular and occasional poker machines players; and this is followed by Chapters 9, 10 and 11 which describe three experimental investigations of the within-session characteristics of poker machine gambling.

The final chapter in this thesis (Chapter 12) integrates the findings of both the survey and experimental studies in order to consider the implications of this work for

existing clinical intervention programmes, and for future gambling research in South Australia.

Section A

Literature Review

Chapter 2
The Nature of Gambling

2.1 Overview

Before commencing a discussion of the 'distal' and 'proximal' causes of gambling behaviour, it is important to understand what is meant by the terms 'gambling' and 'gambling activities'. As will be shown, this apparently simple task is more complex than it appears. The term gambling refers not only to a general type of economic activity, but also to a class of activities which vary considerably in their structure and cost. Therefore, when attempting to identify the definitive elements of gambling, one has to recognise that these elements will be more strongly observed in some activities than in others. In this chapter, these points are discussed in Section 2.2 and 2.3. Section 2.2 discusses the general characteristics of gambling, whereas Section 2.3 examines the different types of gambling activity available in the Australian market, and how these can be classified. These classification systems form an important point of reference for subsequent chapters. In Chapter 3, for example, it will be argued that structural differences can be used to predict gambling involvement, whereas Chapter 4 will show how these characteristics have influenced the development of psychological theories of gambling behaviour.

The second part of the chapter examines the other side of this argument: the demand for gambling products. Included in this discussion, will be the findings of recent sociological and survey studies which have examined people's motivations for gambling. Central to this argument will be an attempt to explain why so many people participate in activities which, in objective terms, offer little chance of a positive return.

2.2 Gambling: problems of definition

According to the Oxford English Dictionary (1992, p.336), the term gambling can be defined in a variety of ways. As well as involving 'a risky undertaking', or a 'risk [undertaken] for much gain', gambling also refers to a style of chance-determined game in which money is staked in order to obtain financial rewards. Thus, the term gambling has both a 'connotative' and 'denotative' meaning. Whereas its connotative definition equates gambling with the process of risk-taking, its denotative meaning

relates to a specific class of activities involving financial risk-taking. Neither of these definitions is entirely satisfactory on its own. If one accepts the connotative meaning and equates gambling with risk-taking, the definition becomes too inclusive and a wide range of other activities, unassociated with card-playing and casinos (e.g., rock-climbing, starting a new business, asking for a date) become types of gambling. On other hand, if one accepts the denotative meaning and equates gambling with certain type of activity, one then has determine what characteristics of these activities qualify them as form of gambling. Thus, as Walker (1992a) and Griffiths (1995a) have pointed out, a more detailed examination on both the 'denotative' and 'connotative' meanings of gambling is required. Such analysis has been attempted by Cornish (1978), Devereux (1968), and Lea, Tarply and Webley (1987) who have examined the common 'identifying' features of gambling activities, and also Weinstein and Deitch (1974) and Solonsch (1991b) who have shown how different activities can be classified and differentiated.

2.3 The 'Connotative' Meaning of Gambling

Cornish (1978) argues that gambling can be distinguished from other forms of risk-taking by the presence of the following 'identifying' characteristics: (a) The existence of an agreement between parties (e.g., bookie or casino vs.the gambler), (b) The exchange of property, with one person gaining at the expense of another, (c) The outcomes of the activity is dependent upon a risky or uncertain situation and the gambler is aware of this before he or she gambles, (d). The activity can be avoided because people do not have to engage in the activity, e.g., as might be the case if one had to undergo a risky medical procedure. However, as Walker (1992a) points out, even this definition is inadequate because these characteristics can also be applied to many other situations involving the transfer or property or money, e.g., business transactions. Thus, in order to overcome this problem, it is necessary to add a fifth condition, namely, that the activity (i.e., gambling) does involve the production of goods or services, but merely a redistribution of wealth between two parties.

This fifth condition is based upon the assumption that financial activities (other than gambling) are necessarily productive, and that it is possible for both parties to gain from the transaction. Unfortunately, it is not clear that all business activities fall into

this category. For example, although mergers, acquisitions, and sales contracts can clearly lead to an overall increase in wealth, this is not so for speculative share-market, bond or futures trading. The buying and selling of shares for capital gains inevitably involves the gain of one party (the seller) at the expense of another (the buyer). This profit or loss made by the participants has no direct effect upon the financial well-being of the general community, nor indeed upon the company whose shares are being traded. Thus, the question arises as to whether the category of gambling should be widened to encompass this type of activity. Previous work by Perkins (1950) has suggested that share-market trading should be included. However, more recent researchers, e.g., Griffiths (1995a), and Blaszczynski, Walker, Sagris, Dickerson (1997) have tended to reject this classification and have argued that speculatory activities should be excluded. As Blaszczynski et al. (1997) write:

> *Some activities clearly encompass all these elements but are not regarded as gambling by a general, but not unanimous consensus. For example, many do not consider taking out an insurance policy or stock-market dealings to fall within the ambit of gambling, although in the last two centuries there were periods when these were regarded as falling within the domain of gambling activity. It is now argued that business activities rely upon the application of economic skill and acumen and therefore should be excluded. Otherwise, the limits of gambling becomes so broad that the term becomes virtually meaningless. (p. 7)*

The argument, here, is that share-market trading should be excluded because this activity involves skill and acumen, but this is also open to criticism. First, although from a theoretical viewpoint it is possible to consider share-market trading as a skilful activity involving the careful analysis and extrapolation of trends, the practical reality is that many share-market deals are likely to be based upon little more than guess-work. This is because of the complexity and inherent unpredictability of share-market fluctuations. Second, although it is assumed that gambling activities are necessarily chance-determined, Walker (1992a), Davis (1995), and Solonsch (1991a) have pointed out that some gambling activities, e.g., horse-racing and blackjack, allow the possibility for skilful play, thereby providing players with a realistic possibility of consistently winning money. Consequently, it is necessary to develop an additional way of distinguishing gambling from other financial activities.

In the author's view, this issue can be resolved by recognising the fact that the term 'chance' may not have the same meaning in gambling as it does in other financial

decisions. Specifically, a distinction can be drawn between the notion of chance in general, and what might be termed 'inevitable chance'. That is, although both gambling and speculation decisions are subject to chance factors, this chance element is not an inevitable feature (at least, theoretically) of financial decision-making. In gambling, the effects of chance can never be eliminated entirely, even in a theoretical sense because of the contrived nature of the activity. In other words, although share-markets might appear, for all practical purposes, to be random and unpredictable, they are not like card-games, roulette wheels or slot machines which are deliberately designed to be that way. With comprehensive information concerning buying pressure, numbers of sellers, and profit margins, it is possible that stock-market speculators can predict the market with some degree of accuracy. However, this opportunity does not exist for gamblers. Instead, despite their best efforts, gamblers will always be faced with many outcomes which they will not be able to control or predict. This applies not only to expert card-counters in blackjack, but also expert racing or sports punters, who will have no way (not even in a theoretical sense) of determining the exact outcome of a game, match or race even after it has commenced. Therefore, it is suggested that Cornish's (1978) definition of gambling needs to be clarified by modifying condition (c). Rather than describing gambling solely in terms of risk or uncertain outcomes, it is better to classify gambling as referring to 'activities which involve an *inevitable* element of chance'. In this way, it is possible to distinguish gambling from other financial activities in which chance is not necessarily an inherent feature.

2.4 Types of Gambling: the 'Denotative' definition

Although all gambling activities share the characteristics described above, they also vary considerably in their cost, availability and structure. Indeed, as Perkins (1950), Jacoby (1950) and Griffith (1995a) have noted, it has become customary to distinguish three distinct types of gambling activity: betting, gaming and lotteries. Betting activities involve the wagering of stakes on the outcome of future events and include such activities as sports-betting and racing activities; gaming activities involve the exchange of money in the course of activity itself (e.g., Casino games, slot machines); whereas the category 'lottery' includes a range of activities which involve drawing numbers by lot in the hope of obtaining a matching set of numbers, e.g., in Australia:

Cross-lotto, Oz-Lotto, Powerball, Super-66, Pools and, to a lesser extent, keno and scratch tickets. This classification system is useful in that it encapsulates all the three main types of gambling available in Australia. However, for the purpose of this thesis, a less categorical, and more analytical approach is required in order to highlight how types of gambling differ from one another. Such an approach is provided by Weinstein and Deitch (1974) who argue that gambling activities can be distinguished in terms of six dimensions. These dimensions include: (a) *The multiplier potential*, which refers to extent to which players can vary the amount wagered, (b) *The pay-out interval*, which refers to the time interval between stakes and outcome, (c) *Better involvement*, which refers to the amount of involvement gamblers have in the process of gambling, (d) *Skill required*, which refers to the extent to which players can influence the outcomes, (e) *The win probability*, which refers to the probability of a gambler winning a single wager, and (f) *The pay-out ratio*, which refers to the amount which could be won on a single gamble. By applying these dimensions, it becomes possible to compare and contrast the differences and similarities of each activity (Table 2.1).

Table 2.1 Structural Characteristics of several common types of gambling available in South Australia

	Multiplier Potential	Pay-out Interval	Player Involvement	Skill Required	Win Probability	Pay-out Ratio
Cross-Lotto	V.LOW	V.LONG	V.LOW	NONE	V.LOW	V.HIGH
Keno	HIGH	AVERAGE	LOW	NONE	LOW	HIGH
Ticket Games	V.LOW	VARIES	LOW	NONE	LOW	HIGH
Cards/Dice	V.HIGH	SHORT	HIGH	HIGH	V.HIGH	LOW
Roulette	V.HIGH	SHORT	AVERAGE	V.LITTLE	HIGH	LOW
Slot machines	V.HIGH	V.SHORT	V.HIGH	NONE	AVERAGE	AVERAGE
Horse Racing	V.HIGH	AVERAGE	AVERAGE	HIGH	AVERAGE	AVERAGE
Sports Betting	AVERAGE	LONG	AVERAGE	HIGH	AVERAGE	AVERAGE

As can be observed from Table 2.1, activities appear to fall into distinct clusters or categories. On the one hand, there are those activities which involve little player involvement or skill, or possibility for stake variations, yet which have a high ratio of stake to potential win (lotteries, keno and ticket games); on the other, there are others which have a higher level of player involvement and skill, which allow considerable

variations in the amount risked, but which provide much smaller returns for each single gamble (e.g., Casino games, horse-racing, sports-betting and slot machines). A further distinction can be drawn between what Dickerson (1984, 1993) has termed 'non-continuous' and 'continuous' forms of gambling. Continuous forms of gambling are those in which there is a short interval between wager and outcome and where responses can be made frequently, whereas non-continuous forms refer to those activities in which there is a long interval between stake and outcome and where responses are made infrequently. Specific examples of very continuous or 'fast' activities include: poker-machines, in which the interval is only 10-15 seconds, casino games (1-2 minutes), whereas non-continuous or slow activities include lotteries (which are drawn only twice a week), 'special racing features', e.g. doubles or trebles, or sporting-events which can take many hours to be decided. Other activities such as racing and keno tend to fall in between these two extremes, with 'playing speed' limited by the frequency of each game or race (approximately every 8 minutes for races, and every 15 minutes for Keno). As will be discussed in Chapter 4, these variations in structural characteristics have important implications for gambling research. For example, as Dickerson (1984, 1993) has argued: continuous activities such as slot machines and racing are more likely to be associated with gambling-related problems than lotteries because they provide the opportunity for gamblers to spend money more quickly, and also increase the likelihood of gamblers losing control over their behaviour.

2.5 Structural Characteristics and the Gambling Market

A further important contribution of this structural classification system is that it may assist in understanding the structure of the gambling market. As Solonsch (1991b) points out: activities which are similar in terms of their structural characteristics are likely to attract a similar type of gambler because structurally similar activities tend to satisfy the same psychological needs or motivations. For example, it may be that those who gamble in order to obtain relaxation avoid activities which involve too much skill or concentration, or that people who gamble for excitement only play continuous activities. Furthermore, activities which require greater skill and concentration (e.g.,

horse-racing, craps, blackjack) may discourage participants because people are unfamiliar with the rules or procedures which are involved. As Solonsch points out:

> *...[a] crucial factor which can inhibit a ...[person] from trialing a particular form of gambling is how well informed or educated that person is with respect to that gambling form.* (1991b, p.14)

Therefore, the structural similarity of activities may make it possible to predict the effects of introducing new forms of gambling, or changes within the existing market. Activities with low skill or involvement may tend to compete with existing chance, or low involvement, activities, whereas new activities with a high involvement or skill component will compete with existing activities of this nature. In support of this assertion, Solonsch draws attention to the fact that the establishment of Casinos in Australian cities had more of an effect upon racing revenue than lottery sales, whereas the introduction of gaming machines decreased revenue from instant lotteries.

Solonsch's classification system differs from that of Weinstein and Deitch in that only two dimensions or characteristics are used, namely, the frequency of responding (or length stake-outcome interval), and the degree of player involvement. In addition, he offers a more extensive definition of 'gambling involvement', arguing that involvement can take many forms. Involvement can be cognitive if players have to undertake a lot decision-making, or concentrate when they gamble; physical, if the gambler has to be physically present at the site of the gambling, or actively participate in the process (e.g., toss the coins in Two-up, roll the dice in craps, or play the banker in baccarat); or emotional, if the activity creates a great deal of excitement or tension (as, for example, in Two-up, racing or craps).

Using this two dimensional system (Dimension 1: high vs. low involvement, Dimension 2: short vs. long interval between wagers and determination of outcome), it becomes possible to understand the likely structure of the Australian gambling market (Figure 2.1). This classification system is remarkably similar to the clusters of activities identified using the six categories identified by Weinstein and Deitch (1974). As shown in Figure 2.1, most gambling activities fall in the upper right-hand quadrant, indicating that most activities involve a high level of gambler involvement and a short interval between wager and outcome. Consistent with Table 2.1, the only activities which appear inconsistent with this classification are lotteries and 'special racing events' (e.g., Melbourne Cup, Caufield Cup, etc.).

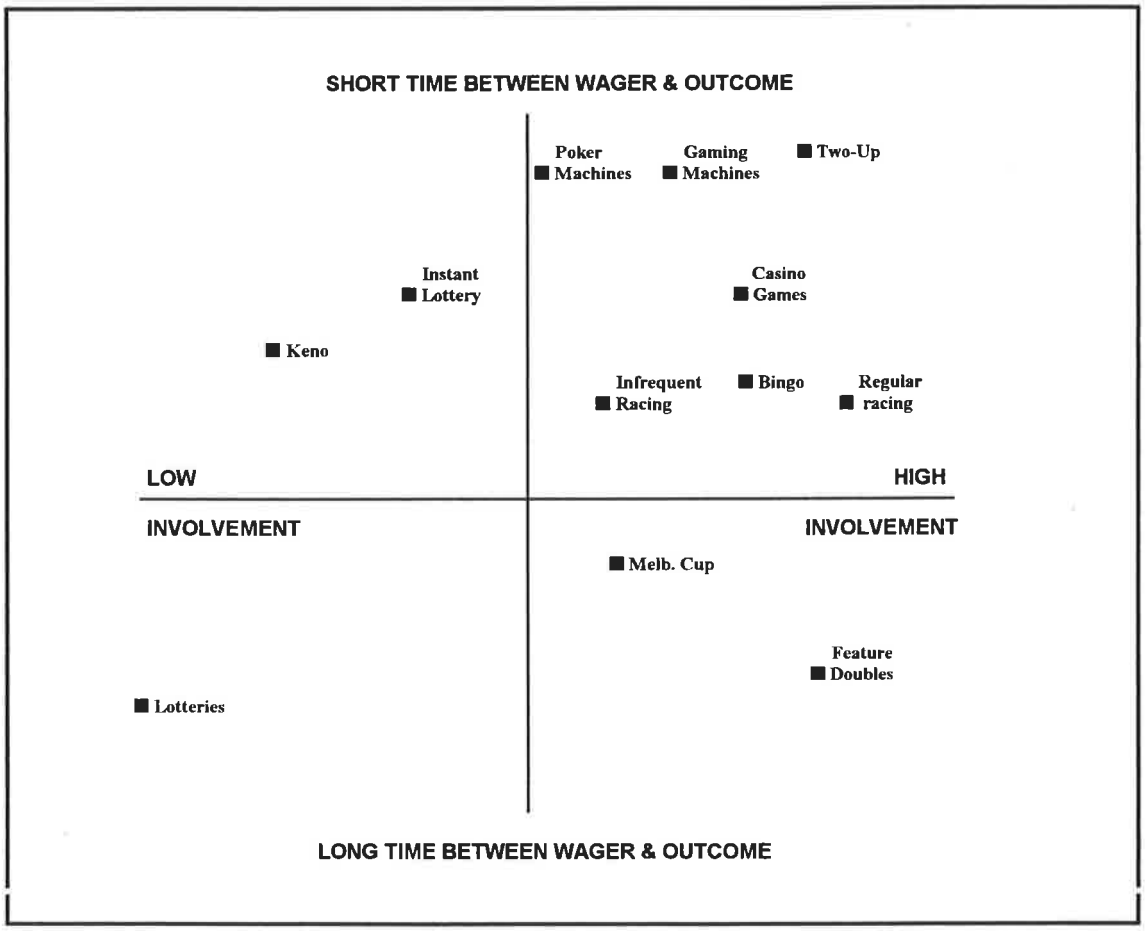


Figure 2.1 Gambling activities categorised according to interval length and level of involvement (Source: Solonsch, 1991b).

A limitation of this analysis, of course, is that does not indicate what type of involvement (physical, emotional or cognitive) is most important. Two activities might be very similar in terms of the amount of physical involvement required (e.g., roulette and blackjack), but differ substantially on the other two dimensions. Moreover, there are conceptual problems associated with the term involvement, since people may gamble on the same activity, but with a different level of involvement (e.g., one horse-racing punter might study the form guide for hours and visit the race track to cheer on his horses, another punter might place his bets by telephone and select his winners based upon what numbers or names he believes to be lucky). Nevertheless, given the satisfactory correspondence between this conceptual map and the 'known' structure of the gambling market in Australia (as revealed by the effect of introducing new types of gambling, e.g., Casinos and slot machines), it appears that 'involvement' is a useful theoretical way of classifying and distinguishing between gambling activities.

2.6 Motivations for Gambling

Although it is well established that most, if not all, gambling activities are unfair and unprofitable for players (Blanche, 1950; Griffiths, 1994; Wagenaar, 1988; Walker, 1992b), people still continue to gamble. Thus, as Walker points out, in trying to explain why people gamble, one is faced with either one of two possibilities: 'either people are not rational or winning money is not the only consideration.' (1992a, p. 246). Typically, previous sociological theories of gambling motivation (Abt & Smith, 1984; Abt, Smith & McGurrin, 1985; Frey, 1984; Goffman, 1967) have tended to support the latter view, arguing that people gamble primarily for rational (non-monetary) reasons. According to this view, people gamble because it provides them with enjoyment, excitement and an opportunity to interact with others (Abt, Smith & McGurrin, 1985; Frey, 1984; Goffman, 1967; Smith & Abt, 1984). Rather than a serious financial venture, gambling is seen as a form of 'play behaviour' not dissimilar to childhood games, and provides '...an opportunity to display social skills, gamesmanship, nerve and wealth.' (Abt et al., 1985, p. 65). Winning is only important because it provides social rewards, and elevates the person's status in relation to other gamblers.

This view is supported by Goffman (1967) who argues that people gamble for the sake of the 'action'. This action arises because of the risky nature of the activity, and also because of the challenge of gambling, which provides players with the opportunity to display their skill, courage and finesse. Similar views have also been expressed by Walker (1992a) (although from a psychological perspective), who argues that serious gamblers are '...attracted to games which involve an appropriate mix of chance and skill.' (1992a, p. 16), and also by Chantal, Vallerand & Vallieres (1995) and Chantal and Vallerand (1996), who have found that people who obtain the most enjoyment from gambling are more 'intrinsically' motivated. This is based upon a gambling motivation scale which associates intrinsic motivation with a need to obtain enjoyment and to improve one's skill, and in which extrinsic motivation is associated with a desire to win money.

As Walker (1992a) has pointed out, there is little doubt that enjoyment, excitement and a need for socialisation play an important role in gambling. However, as he also points out, there are strong reasons to believe that these factors do not provide the

only explanation. For example, although many people enjoy gambling in groups, there are many people for whom this is not so. Many slot machine players, for example, prefer to gamble alone and actively shun all attempts by others to engage them in conversation. Furthermore, a second, and perhaps more serious problem, is that sociologists have failed to explain why risk-taking, calculating odds, and competition are exciting. In other words, what aspect of gambling creates a sense of challenge and makes it risky? According to Walker (1992a), the answer is: money. Gambling is only exciting and challenging because it is possible for people to win and lose money. Without this characteristic, gambling would not have a purpose, and so it is fallacious to speak of other motivations, e.g., as enjoyment, excitement, for the challenge, as being independent of this primary motivation. While it is true that most people probably do not expect to win money when they gamble, it seems reasonable to suppose that most will gamble, at least with the hope, that they will make a profit; although, the strength of these motivations may vary according to the type of gambling involved. With activities that provide players with little opportunity for skilful play (see Table 2.1), e.g., lotteries, it is likely that people will hope to win (Chantal & Vallerand, 1996), but will have little expectation of winning. By contrast, in activities which players with the opportunity for skilful gambling (e.g., blackjack, horse-racing), people will be more intrinsically motivated (e.g., people try to play well, test their skills), but they will also have a greater expectation of winning money.

In general, these points have been confirmed by existing survey studies of gambling motivation which have found that amusement, excitement, and winning money are all important motivations for gambling. For example, Caldwell (1974) found that 20% of Australian gamblers expected to win money from gambling. Kallick-Kaufmann (1979) found that a third of a sample of gamblers in Nevada responded that 'winning money' was a primary motivation for their gambling, with nearly all lottery and number players providing this reason. More recently, Griffiths (1993a) has found that 57% of adolescent slot-machine players in Britain gamble in the hope of winning money, whereas Dickerson, Walker, Legg-England and Hinchy (1990) found that 40% of racing punters believed that some skill was involved in racing (i.e., which implies the possibility of winning). These findings have also been found in Canadian research using video-poker players (Dumont & Ladouceur, 1990) and in Germany by Fabian (1995),

who found that winning money was most common amongst people who gambled on 'traditional' types of gambling such as casino games and racing. Although Walker (1992a) has found that 'winning money' appears to be less important among adult slot machine players, this may be the result of socially desirable responding. That is, people are reluctant to admit their true intentions to avoid appearing foolish in front of the researcher [NB. The issue of gambling motivation, particularly in relation to slot machines, will be considered in more detail in Chapter 8].

Further support for the importance of money in gambling is provided by Hess and Diller (1969), who argue that motivations of the gambler are reflected in the marketing strategies used by casinos to attract patrons. They found that most of the advertising is 'rational-economic'. Gambling is promoted as a possible source of profit. The photographs and names of winners are publicised. Gambling venues advertise that their slot machines have the best payouts and free meals, and junkets and drinks are provided as inducements. These inducements convince the gambler that he is 'economical' and capable of 'spotting a bargain'. Furthermore, the venue substitutes the word 'gambling' for the word 'gaming' so as to disguise the risky nature of the enterprise and to emphasise the challenge which the activity affords.

For these reasons, some researchers have concluded that gambling is an irrational behaviour (Cohen,1972; Oldman, 1974; Wagenaar, 1988). If most gamblers can only expect to lose, yet continue to gamble in the hope that they will win, gambling cannot be considered rational according to established theories of economic behaviour (e.g., Eadington, 1987; Von Neumann & Morgenstern, 1947) in which it is presumed that people try to maximise their gains and minimise their losses. However, as will be discussed in the following section, this conclusion may be based upon (the perhaps erroneous assumption) that what is rational from an objective or normative perspective is also necessarily rational from a subjective viewpoint.

2.7 The Rationality of Gambling

As Cohen (1972) points out, rational models of gambling are generally based upon two common assumptions: first, that the value of each gamble can be assessed by multiplying the utility of each outcome by the corresponding probability of success, and then obtaining the sum for all possible outcomes; second, that the gambler chooses

those gambles which involve the greatest product of utility and probability. However, as Cohen and more recent researchers have shown, this rarely proves to be so. As discussed above in Section 2.7, objective probabilities are misleading in that they do not allow one to distinguish between expectations of winning, and 'hopes of winning'. Two gamblers might agree about the objective probability of success (e.g., 0.5 for heads on a single coin-toss), but one may have a greater confidence in winning than the other. This may be because one gambler believes himself to be more lucky, or skilful than the other gambler, or because of any other irrational beliefs which he might hold concerning the activity (e.g., a belief in negative recency, that the probability of heads in influenced by the frequency of heads on previous throws). In other words, the subjective probability of success might differ from the objective probability, and players may rely more strongly upon the latter when determining the value of a particular gamble. Therefore, what might appear a bad, or 'irrational', bet from an objective viewpoint may appear more attractive to a committed, or experienced gambler.

Similar problems are associated with the notion of utility. In addition to the fundamental problem of trying to measure this concept (Winefield, 1962), research has also found that the value of gambles varies considerably depending upon a person's level of aspiration (Siegel, 1957) previous gambling experience (Cohen, 1972), or their need for money (Lesieur, 1984). Those who are in debt, or who are chasing losses, or have previously won large amounts of money, might be willing to accept gambles with longer odds, and may be only satisfied if they obtain large wins (e.g., from betting on outsiders in races, placing 'field' bets in craps, betting on single numbers in roulette). This is despite the fact that such choices may be the less profitable in objective terms, for example, as measured by the magnitude of the 'house-take' (Solonsch, 1991b). In other words, while it might appear foolish for gamblers to believe that they can 'solve their problems' through gambling, the gambler might feel that there is no other choice; his decision may seen perfectly rational from his personal viewpoint.

A further problem is that subjective utility and subjective probabilities might differ. Research by Cohen (1972) and Edwards (1953) has shown that people have preferences for certain win probabilities, because these appear to provide them with greater excitement than other possibilities. For example, in a study of roulette,

Edwards found that players do not try to maximise their gains, or minimise their expected losses because: '...there would be little fun in gambling throughout a long session for the smallest gain and with the smallest chance of losing." (Cohen, 1972, p. 72). Although this would appear to offer support for the sociological theories described above which argue that profit maximisation is not central to gambling, this is unlikely to be so, because these long-shot bets, or 'irrational' gambles, are still motivated by the desire to win money. Indeed, as noted above, these 'long-shot' bets are most likely to be made by people who have the greatest desire, or need, to recover debts or losses incurred by previous gambling. Accordingly, as Winefield (1962) points out, it is not possible to characterise rationality in general normative terms because:

> *...it is only reasonable to characterise behaviour as rational or irrational in terms of individual goals...[and] there is nothing irrational in holding different views from most other people. (p.31).*

In other words, attempting to win money from gambling is not an irrational goal, even when gambling activities are designed to deny the possibility of long-term profits. The focus instead should be upon those erroneous beliefs which underlie or uphold this belief. Discussion of these irrational beliefs is continued in Chapter 4, which considers the contribution of recent cognitive research to the study of gambling.

2.8 Summary and Conclusions of Chapter 2

From this discussion, it is clear that the notion of 'rationality' is more complex than initially suspected. Despite the fact that the objective odds of gambling activities favour the house, and that gambling inevitably involves some level of uncontrollability or chance (Section 2.2), people still gamble to win money, and to make a profit. Even if most do not expect to win and 'winning money is not the primary motivation', it is likely that the enjoyment, challenge and excitement they experience from gambling is related to the financial nature of the activity. Gambling is exciting because one can win money, and risky because one can lose money; although, the relative importance of these motivations would appear likely to vary according to the structural characteristics of the activity (see Table 2.1 and Figure 2.1). Those activities which provide gamblers with a realistic possibility for skilful play will increase people's expectation of winnings (see Walker. 1992a) while also providing them with the opportunity to match their skills against others, improve their performance (an

'intrinsic' motivation, Chantal, Vallerand & Vallieres, 1995; Chantal & Vallerand, 1996). In contrast, those activities which provide little direct involvement (e.g., lotteries) are likely to provide little 'intrinsic' satisfaction and are attractive only because they offer the possibility of providing very large wins (an 'extrinsic' motivation).

Therefore, as Solonsch (1991b) has speculated, it is possible that these motivational factors might be useful in understanding the nature of the gambling market. Those who enjoy the challenge of testing their skills, making complex decisions and who have a higher expectation of winning money should be attracted to those games which provide these opportunities (e.g., betting activities rather than slot machines and lotteries). On the other hand, those who are more interested in using gambling as a way of relaxing, escaping worries, or trying their luck, will be more attracted towards activities where outcomes are largely chance-determined. These issues are explored in more detail in the following chapter (Chapter 3) which examines the 'distal' causes of gambling behaviour. Of particular interest, is to consider which sub-groups of the population are most likely to gamble and the extent to which this is related to the varying motivations which underlie their participation.

Chapter 3

General Predictors of Gambling Involvement

3.1 Overview

Despite the pervasiveness of gambling in Western societies, only a certain percentage of people gamble (AGB McNair, 1995; Blaszczynski, Walker, Sagris & Dickerson, 1997; Dickerson, 1995; Dickerson, Allcock, Blaszczynski, Nicholls, Williams & Maddern, 1996; Kallick-Kaufmann, 1978; Wooton, 1995). Thus, as Walker (1992a) points out, it is of interest to examine the demographic and personality variables which may be associated with differences in involvement. As discussed in the previous chapter, this type of analysis is of particular importance because it allows researchers to understand the nature of the gambling market. By showing that certain types of people gamble more than others, or choose different activities, this analysis makes it possible to anticipate the effects of introducing new types of gambling and, conversely, the effects of changes in the demographic characteristics of the population.

In this chapter, it will be argued that variations in gambling participation can be explained in terms of two factors: first, the relative accessibility of gambling to different population groups, and second, people's attitudes towards, and motivations for, gambling. By 'accessibility' it is implied that people will be more likely to gamble when gambling opportunities are: geographically accessible, conducted at venues seen as physically or socially desirable, or financially attractive. On the other hand, it will be argued that people's preferences for gambling activities may be influenced by their motivations for gambling. For example, as outlined in Chapter 2, it is possible that people who gamble to obtain large wins prefer lotteries; those who enjoy competition and challenge choose more skilled activities, whereas a more general desire for excitement may be associated with a preference for continuous rather than non-continuous gambling activities (see Table 2.1 or Figure 2.1).

As will be discussed below, even though numerous survey studies have been conducted to examine the relationship between demographic characteristics and gambling, there has been little research that has examined why these associations exist. Consequently, the purpose of this chapter is to provide both a brief summary of

previous research findings, and also a critical evaluation of the theories which have been advanced to explain the results. The first part of this chapter considers the role of demographic factors, including, socio-economic status, religion, marital status, age and gender in gambling participation, whereas the second part examines the possible role of personality differences.

3.2 Socio-Economic Status

According to many researchers (e.g., Downes, Davies, Davis, & Stone, 1976; Frey, 1984; McGurrin, 1992; Rosecrance, 1985; Volberg & Steadman, 1992; Walker, 1992a), people with lower incomes, who are unemployed, or who work in lower status occupations have been found, not only to spend a relatively greater percentage of their disposable incomes on gambling, but also to experience the highest incidence of gambling-related problems. Thus, it has been argued that 'gambling plays an important role in maintaining the economic structure of a society.' (Blaszczynski, Walker, Sagris, Dickerson, 1997, p. 12). As well as providing people with an amusing diversion, it is also a subtle way in which money is transferred away from the lower socio-economic (SE) classes towards the wealthier sectors of the society (e.g., the gambling industry). Therefore, it is important to determine why people with a lower SES have such a strong affinity for gambling. In general, two theories been advanced: one based upon micro-economic theory, the other derived from sociology.

The economic theory, as advocated by Brenner and Brenner (1987), argues that working-class people are attracted to gambling because of variations in the 'marginal utility of money', whereby the potential gains from gambling are seen as more attractive to those with smaller annual incomes; and also because of 'financial frustration', whereby gambling is seen as a way of supplementing the meagre returns gained from lower status employment. Indeed, as pointed out by Kaplan (1984) and Cheung (1997), Shapira and Venezia (1992) in relation to lottery gambling, the prospect of winning a large amount of money with a small stake provides a possible way of escaping the drudgery of uninteresting, routine work and a chance to elevate one's living standards. On the other hand, the sociological explanation offered by Caldwell (1985), suggests that high levels of gambling by people with a lower SES (particularly in Australia) may be the result of an historical association between

gambling and working-class culture. According to this view, gambling has maintained its popularity because it reflects many of the values central to the Australian working-class ethos. These values include: the importance of 'mateship', equality and a willingness to take risks (i.e., as reflected in the early pioneering and prospecting days).

Although not all these principles may still apply in Australia today, or in other countries, most studies still show that a high proportion of the people seeking assistance for gambling-related problems are those with a lower SES, thus confirming the potentially regressive nature of gambling (e.g., Department of Treasury and Finance, 1995-South Australia; Kroeber, 1992-Germany; McGurrin, 1992; Sommers, 1988; Volberg, 1994; Volberg & Steadman, 1992-United States). However, as recent research has also shown, the trends for general gambling appear to be changing, with participation levels increasing in other SE groups. For example, research in the United States has shown that gambling is attracting a larger percentage of middle-class punters (Kallick-Kaufmann, 1979; Rosecrance, 1986). Similarly in Australia, recent surveys in Victoria, (e.g., AGB McNair, 1995; DBM Consultants, 1996) have found that upper-white collar males were more likely to gamble on certain activities than those with lower incomes or lower occupational status. Although no research has been conducted to explain why this has occurred, it is likely that this can be attributed to the increasing accessibility of gambling activities which may now appear more appealing to middle-class people. In other words, whereas in the past, most gambling was conducted at race-tracks, and in hotels, people can now also gamble over the telephone, at Casinos, clubs, and on the Internet. White-collar workers who might previously have felt reluctant to gamble at a locations traditionally associated with the working-classes, may now be willing to gamble at venues which are conveniently located, have formal dress codes (e.g., Casino) and which attract people of a similar economic status. Thus, it appears that while SES may predict the incidence of gambling-related problems, the association between SES and general gambling involvement may not be so clearly defined.

3.3 Religion/ Moral Attitudes Towards Gambling

This variable has received relatively little attention in most published research. However, as Grichting (1986) has pointed out, the role of religion may be more

important than initially believed. Grichting based his conclusions upon a random door-knock study of 318 residents in Northern Queensland, in which he asked people to say how often they gambled and their religious denomination. Consistent with previous research by Kallick-Kaufmann (1979) and Kalliack, Suits, Dielman and Hybels (1979), Grichtig's results showed that Catholics were significantly more likely to gamble than Protestants and those who reported no religion, even when one controlled for gender, age and SES. This difference was attributed to the different emphasis given to work and leisure by the two denominations. Whereas Protestants dislike gambling because of their strong belief in the importance of hard work and thrift, Catholics, on the other hand, do not subscribe to these beliefs. Instead, gambling is seen as a luxury or pastime which is acceptable as long as it does not interfere with one's other duties (Grichting, 1986). From this it can be concluded that countries or areas with a greater concentration of Catholics should have more positive attitudes towards gambling. However, no research has so far been conducted to test this hypothesis in other areas outside of Queensland.

3.4 Marital or Personal Status

Since most gambling activities are time-consuming and are undertaken away from home, it would be logical to expect that gamblers would be more likely to be single than married (Lesieur, 1984). Single gamblers would have more gambling opportunities, have fewer fears of being monitored or detected, and could spend as much as they like without being criticised. Moreover, single people could not be held accountable for their actions, and would be less likely to have someone relying upon them for financial support. Results from survey studies have generally supported this hypothesis. For example, it has been found that single people are not only more likely to gamble (Downes et al., 1976; Kallick et al., 1979), but also to experience gambling-related problems (Dickerson et al., 1996; Dielman, 1979; Kroeber, 1992; Sommers, 1988; Volberg, 1994), although, this relationship may sometimes be mediated by income level (Volberg & Steadman, 1992), with single people over-represented among problem gamblers with low incomes, and also age (Kallick-Kaufmann, 1979; Kallick et al., 1979) with widowed found to gamble less frequently than younger people who have never married.

Finally, although no studies have specifically examined whether marital status influences the type of gambling in which people are involved, it is likely that continuous activities such as casino games, gaming machines and racing would be less accessible to married people because of the time commitment required. On the other hand, this difference should be less strongly observed in relation to non-continuous activities such as lotteries.

3.5.1 Age Differences

Relatively little research has been conducted to examine the relationship between age and gambling. However, in a detailed study in the U.S. State of Iowa, Mok and Hraba (1991) have shown that age is an important predictor of gambling involvement. Consistent with previous research by Downes et al. (1976) and Kallick et al. (1979), Kallick-Kaufmann, (1979), Mok and Hraba (1991) have confirmed that gambling participation is negatively associated with age. Older people are generally less likely to gamble than younger people, with 85.5% of 18-24 year olds reported having gambled at least once during a 12 month period compared with only 30.6% of people aged 75+ years or more. Older people also differ in their gambling preferences, having a greater preference for lotteries and bingo rather than racing and casino games. In addition, older people are significantly less likely to experience gambling related problems than other age-groups. Studies in the United States, for example, (e.g., Volberg, 1994; Volberg & Steadman, 1992) have shown that problem gamblers are most likely to be middle-aged, whereas Australian and New Zealand studies have observed the highest incidence of gambling-related problems in younger age cohorts (Australia and New Zealand-Abbott & Volberg, 1996; Dickerson et al., 1996; Blaszczynski, Buhrich & McConaghy, 1985; Blaszczynski & McConaghy, 1989).

Mok and Hraba (1991) have advanced a number of explanations to account for these age differences. However, their most elaborated argument is based upon Erikson's (1963) theory of human development which explains the difference in terms of age-related variations in motivation and life-goals. According to this view, older people are less involved in gambling because the goal of winning money (the primary motivation for gambling, see Chapter 2) is seen as less important. This motivation is seen as inconsistent with the developmental ideals of old age, which emphasise the

importance of disengagement and contemplation, and a reduced desire for elevating one's position in society. In contrast, younger people, because they have a greater need for financial wealth and advancement, will have a greater interest in gambling. Mok and Hraba's study does not provide a valid test of this hypothesis because no measure of gambling motivation was included in their survey. However, as recent research conducted in the Australian State of Victoria (Morgan Research, 1997) has shown, motivational differences may indeed underlie the pattern of participation which Mok and Hraba observed. As Morgan Research found:

> *...older people were seen as having a range of reasons for gambling, with winning money of relatively low importance, there was a view that winning was often one of the main reasons for younger people to gamble. Younger people were also characterised as having a greater expectation for winning and a belief that gambling would change their financial circumstances for the better. (p.31)*

In other words, younger people appear to gamble for different reasons than older people, placing greater emphasis upon winning money rather than amusement or excitement. If this conclusion is correct, then this may also explain why younger people choose to gamble on different activities than older people. Consistent with the argument presented in Chapter 2, younger people choose to gamble on casino and racing activities because these provide a realistic chance of success, and allow gamblers to influence the outcomes by using strategies or knowledge. However, as Morgan Research (1997) and Walker (1992a) also point out, this conclusion must be treated with caution because it may be confounded by the relative accessibility of these types of gambling for different age-groups. Older people may be reluctant to gamble on certain activities (e.g., casino games), not because they are uninterested in winning, but because these activities are too expensive, are geographically inaccessible, and require too much mental effort. The reduced memory capacity, eye-sight and hearing of elderly people may make them cautious about undertaking any activity which requires having to interact with other people (e.g., a croupier) or make decisions in a short interval of time, e.g., as is the case in blackjack. Consequently, their tendency to prefer lotteries and bingo may be a way of avoiding embarrassment and obtaining greater enjoyment and relaxation from gambling.

3.5.2 Underage Gambling

Although most gambling research has been concerned with adult gamblers, researchers have also recognised the importance of examining the incidence of gambling amongst adolescents and children (Fisher, 1991, 1993, 1995; Fisher & Griffiths, 1995; Griffiths, 1991; 1993a, b;1995a,c). Such research has emerged, not only because of an interest in underage gambling per se, but also because of a growing interest in the etiology of adult gambling. Research has shown that many adults with gambling problems report having experienced difficulties at a very early age (Custer, 1982, 1984; Dell, Ruzicka, & Palisi, 1981). For example, in the U.K., Dell, Ruzicka and Palisi (1981) found that 37% of problem gamblers began gambling when they were 10 years old and 47% between the ages of 11 and 18 years, whereas Griffiths (1995a) has found that most started gambling at the age of 9. Similar results have also been obtained in North America by, e.g., Schaffer, Labrie, Scanlan and Cummings (1994), and by Ladcouceur, Dune & Bujold (1994), and Derevensky, Gupta and Cioppa (1996) in Canada. Ladouceur et al. (1994) found that 86% of 4th-6th graders had gambled in some form or other during their lives: 34% had bet on sports, 59% had played lotteries, 36% had gambled on cards and 22% had played bingo. Most of this gambling had been undertaken with their parents. Little research has, however, been conducted in Australia, although preliminary results obtained by Maddern and Dickerson (1997) suggest that overseas results are likely to be generalisable to this country.

The most extensive studies of this issue have typically concerned adolescents in the U.K., where slot or fruit machines are available in amusement arcades and are accessible to minors (Fisher, & Griffiths, 1995; Griffiths, 1995a), and also among college populations in the United States (e.g., Lesieur & Klein, 1987). British studies have shown that over 50% of adolescents gamble on fruit machines at least once every 12 months, with many gambling on a weekly basis (see also Huxley & Caroll, 1992). Even higher figures were obtained by Lesieur and Klein. (1987) who found that between 75% and 90% of students surveyed at 6 American colleges and universities had gambled at least once during the previous 12 months. In addition, Lesieur et al. found, using the South Oaks Gambling Screen, a validated measure of problem gambling (Lesieur & Blume, 1987), that 5.5% of those surveyed could be classed as

probable problem gamblers. Thus, it has been suggested that surveys of underage gambling may play an importance role in the development of research programmes designed to assess the nature and development of adult gambling. This is particularly important in Australia where the incidence of gambling-related problems has been found to be highest in gamblers aged between 18 and 35 years.

3.6 Gender and Gambling: overview

Although many writers have drawn attention to the lack of research into gender differences in gambling (Mark & Lesieur, 1992), evidence of gender differences in gambling participation, choice of activities and risk-taking are widely reported. However, as will be discussed below, relatively little research has been conducted to determine why these differences exist. In the following section, a detailed analysis of the existing literature is provided along with a discussion of the theories which have been advanced to explain the nature of the most commonly observed gender differences.

3.6.1 Gender and Gambling Participation

One of the most consistent findings in gambling research is that significantly more men are involved in gambling than women at all age levels (Dickerson et al., 1991; Griffiths, 1995; Kallick et al., 1979; Kallick-Kaufmann, 1979; Schaffer et al., 1994; Walker, 1992a). Men are also significantly more likely than women to experience gambling-related problems (Abbott & Volberg, 1996; Blaszczynski, 1996; Dickerson et al., 1995, 1996; Ibanez, Mercade, Sanroma & Cordero, 1992; Lesieur & Blume, 1987; 1991; Mark & Lesieur, 1992; McGurrin, 1992; Sommers, 1988; Volberg & Steadman, 1992). In both Australian and American studies, it has been commonly found that the number of men receiving treatment for gambling problems outnumbers women by a ratio of 10 to 1, with the differences in overall involvement usually 20-25% greater for men. Thus, as Mark and Lesieur (1992) have pointed out, this has often led researchers to underestimate the importance of gender in gambling. For theoretical and practical reasons, a separate or 'feminist' approach to gambling seemed unnecessary, and it was tacitly assumed that theories and treatment programmes developed through studies of male gamblers could also be validly applied to women.

During the last decade, however, new research has emerged which has challenged these assumptions. For example, Hraba and Lee (1995) have found that women in the United States are just as likely to gamble and to experience gambling problems as men. Similarly, in Australia, recent estimates of the number of women seeking assistance for gambling-related problems have ranged from 33% in Queensland to 57% in Victoria, with similar figures being reported in South Australia (Inquiry into the impact of gaming machines and hotels and clubs in South Australia, 1995). Furthermore, surveys of community gambling patterns Australia (e.g., AGB McNair, 1992; 1995; DBM consultants, 1995; Dickerson et al., 1996) have consistently shown that Australian women are just as likely to gamble as men. Thus, as Mark and Lesieur (1992) anticipated, research into the relationship between gender and gambling behaviour has come to be of considerable practical importance.

This new research has also revealed several noticeable differences between the gambling habits of men and women, suggesting that gender-differences may have important theoretical implications for gambling research. The first of these is that men and women appear to differ in their preference for gambling activities (Delfabbro & Winefield, 1997; Hraba & Lee, 1995; Kallick et al., 1979; Lesieur & Blume, 1987; Lindgren, Youngs, McDonald, Klenow, & Schriner, 1987; Mark & Lesieur, 1992). Specifically, women have been found to gamble on a narrower range of activities than males and to prefer activities such as bingo, raffles and poker machines, but they are less likely to be involved in card games, casino games, racing or sports betting (AGB McNair, 1995; Dickerson et al., 1991; Lindgren et al., 1987). The second is that women generally tend to take fewer risks and spend less money when they gamble (Bauer & Turner, 1974; Bruce & Johnson, 1994; Hraba & Lee, 1995; Kallick et al., 1979), a fact which has also emerged in studies of underage gambling (Ladouceur et al., 1994; Shaffer, 1994). Although, this difference in risk-taking can, in part, be explained in terms of differences in the types of activities preferred by men and women, namely, the lower cost of activities preferred by women, e.g., bingo, poker machines and lotteries (NB. not in the U.S., see Kallick et al., 1979) other studies conducted outside the area of gambling have found gender-differences in risk-taking tasks which do not involve money (e.g., Arenson, 1978; Hudgens & Fatkin, 1985; Kahle, 1980;

Karabenick & Addy, 1979; Levin, Snyder & Chapman, 1987; Martinez, 1995; Sorrentino, Hewitt & Raso-Knott, 1992).

As Bruce and Johnson (1994) and Griffiths (1995a) point out, the fact men prefer more skilled types of gambling and are also willing to take greater risks when they gamble raises the question of gender-differences in ability. That is, men might prefer skilled games and take greater risks because they are more confident and knowledgable about the games than women. However, as recent studies have shown this appears unlikely. Walker, Sturevska and Turpie (1995) have recently found that female blackjack players are no more likely to deviate from optimum betting strategies, whereas Bruce and Johnson (1994) have shown that the quality of betting decisions in women racing punters differs very little from that of men. Moreover, the fact that many women are involved in skilled activities such as contract bridge suggests that the difference is unlikely to be the result of women having less ability in decision-making tasks. Instead, it has been argued that the differences are more likely to be the result of differences in sex-role socialisation and beliefs about the types of behaviour seen as appropriate for men and women. As the discussion below will show, this argument is more complex than it may at first seem because different researchers have approached the topic from slightly different perspectives.

3.6.2 Explanations for Gender-differences

According to Lindgren et al. (1987) and Walker (1992a) gender-differences in gambling can be explained in terms of traditional gender roles. Women do not gamble as often as men because they have unfavourable attitudes towards gambling. These attitudes exist because women see themselves as 'guardians of the hearth' and believe that gambling is a threat to the well-being of the household. Rather than seeing gambling as an amusing past-time, women (it is argued) believe that all gambling is a waste of money, and a dangerous precursor to compulsive gambling. In order to investigate these hypotheses Lindgren et al. conducted a survey of 2000 people in North Dakota asking for details of gambling involvement, and people's attitudes towards gambling. The results showed that, although women were more likely to disagree with the legalisation of gambling in public places, they did not find gambling more offensive or morally harmful. Thus, there was little evidence to suggest that

women avoid gambling because of their reluctance to enter the 'world of public affairs', or because of their duty towards the maintenance of the household. The fact that women were less likely to support gambling in public places could have been related to other factors, including their dislike of the type of gambling involved, or their beliefs about what behaviour is appropriate or inappropriate in public places. It seems unlikely, given the extent to which women have adapted many traditionally male activities, that the 'moral' or 'traditional attitudinal' impediments to gambling suggested by Lindgren et al. are still applicable in the 1990s.

Instead, a more plausible hypothesis is based upon the idea that gambling is an adult form of play, not dissimilar to the activities which children engage in from an early age (Abt, Smith & McGurrin, 1985; Griffiths, 1995; Smith & Abt, 1984). Thus, it can be argued that any differences which are observed in adult gambling behaviour can be explained in terms of gender-differences in childhood and adolescent behaviour. The notion, here, is that there are fundamental differences between the play behaviour of boys and girls. As Smith and Abt (1984) and Goffman (1972) point out, boys' games tend to be more aggressive and competitive than those of girls. Boys attempt to elevate their status in relation to their peers, to dominate others, to display their skills, gallantry and courage, and so they prefer activities such as marbles, card flipping and card games (Thompson, 1991). These early interests may subsequently give rise to an interest in video games (Griffiths, 1991) which may, in turn, give way to gambling on slot machines or other gambling activities (Griffiths, 1995a).

In other words, if one can understand early play behaviour, one might also understand later gambling because those who have more positive attitudes towards gambling as children will also probably have more interest in gambling as adults. In addition, those who have gambled as children will know how to gamble, and this increases the accessibility and attractiveness of gambling during adulthood. For example, if Ladouceur et al. (1994) are correct in assuming that children acquire the skills of gambling as a result of social-learning, it is also likely that children model the behaviour of the 'same-sex' parent. Boys learn how to play cards, and how to bet on horses from their fathers, whereas girls do not. Thus, all other things being equal, boys grow up with a wider knowledge of gambling, and this is reflected in a wider range of preferred activities (Hraba & Lee, 1995). Such differences are, then, further

strengthened during adolescence through gambling with peers, who have also learnt the rules of games such as blackjack, craps, poker from older male members of their family.

Unfortunately, a limitation of this argument is that it is assumes that childhood experience necessarily determines adult experience; but is this always so? This seems unlikely. Despite having experienced differences in socialisation, women have many opportunities to learn how to gamble during adult life through acquaintances, family and by reading and observation. Thus, it is likely that there other factors which need to be considered before any definite conclusions can be drawn about gender-differences in gambling preferences. One of these factors relates to gender-roles and cultural differences between the activities typically identified as masculine and feminine.

According to Walker (1992a), women are less likely to gamble on such activities as cards or racing, not because of the nature of the activities, but because gambling venues such as betting-agencies, race-tracks and casinos have been traditionally identified as 'masculine' locations. Women may find the atmosphere of these venues uninviting because of the predominantly male clientele, who have their own jargon and ways of interacting. Thus, even if they are familiar with the rules of gambling, women will be reluctant to participate because to do so might seen unfeminine and likely to attract scorn from men or other women. However, as Blaszczynski et al. (1997) point out, an obvious weakness of this argument is that it ignores the fact a lot of gambling on races is now undertaken by telephone (Cooper, 1995). Women do not need to visit betting agencies and tracks to place bets, so their lack of interest cannot be the result of their dislike of the gambling venues. Furthermore, as pointed out by Blaszczynski et al. (1997), most gambling venues provide:

> *a safe, non-threatening and entertaining outing for women, where they can attend on their own or in mixed company and at most hours of the day. Hotels [and Casinos] have deliberately changed their predominantly male-orientated culture and physical environment to make it more attractive, appealing and acceptable to women.(p.9)*

Consequently, other researchers such as Delfabbro and Winefield (1997) have suggested that the nature of the venue is unlikely to be a decisive factor in influencing gambling preferences. Instead, they suggest an alternative explanation for gambling preferences. This argument is also based upon gender-role differences and is based upon the findings of previous psychological research which has compared the

performance of men and women on various decision-making and risk-taking tasks (Deaux & Emswiller, 1974; Deaux, White & Farris, 1975; Feather, 1969; Hudgens & Fatkin, 1984; Levin, Snyder & Chapman, 1987; Martinez, 1995). The argument is that beliefs about gender-appropriate behaviour need to be understood in relation to the structure or nature of the tasks themselves. The general finding is that, even in everyday life, women often tend to prefer tasks where outcomes are a function of chance, whereas males prefer activities which contain some element of skill. Thus, differences in preferences for gambling activities may simply reflect this general trend (see Table 2.1 for list of skilled and unskilled activities). Racing and casino games may be preferred by men because they allow the possibility of control, skilled play and competition, whereas women enjoy bingo because of the absence of these qualities.

As Deaux et al. (1974) and Martinez (1995) note: men prefer, and persist longer on, skilled tasks because they have a higher expectation of success. This is because skilled and achievement related tasks have traditionally been associated with male achievement (Deaux et al., 1974), and also because women are less self-confident and have low expectations for success on activities perceived to be masculine (Beyer,1990; Martinez,1995; Stein,1971). Deaux and Emswiller (1974) and Martinez (1995) further argue that these differences in preference and expectation are confirmed and maintained by the attributions which men and women make when succeeding on masculine tasks. When women succeed they tend to attribute their success to luck (an unstable/ external quality), whereas men attribute their success to skill (a stable/internal quality). In other words, outcomes are interpreted in a manner consistent with their initial expectations for success. Thus, for many women, success on masculine/skilled tasks often does not engender the belief that control *is* possible. Rather, these events are seen as inconsistent and are 'explained away' by external attributions (Martinez, 1995).

In Delfabbro and Winefield's study, a small sample of casino gamblers (20 male and 20 female) were asked to rate their preferences for, and involvement in a number of common gambling activities and also to rate how much skill each activity involved. As predicted by research overseas, men were found to be significantly more likely to have gambled on racing and casino games and to rate the activities as involving greater skill. Further differences were observed in a short experiment that followed the

questionnaire, which showed that men persisted significantly longer with the skilled game and showed a dislike for the chance game. Although this study was unable to confirm that men and women made different attributions for success or failure, other studies have provided evidence which appears consistent with these hypotheses. For example, Hong and Chui (1988) found that male involvement in a Hong Kong lottery was mediated by the number of strategies used in picking the numbers (the notion of illusory control discussed in Chapter 4), whereas Pierce, Sagris and Loughton (1997) have found that male problem gamblers are significantly more likely to believe that skill or control is possible when gambling on slot machines.

A weakness of this argument is that it assumes that the male gender-role is necessarily identified with skilled tasks; a point which clearly open to challenge. Not all games of skill are regarded as masculine. As noted above, the game of contract bridge is a game of skill, but it attracts many talented female players, all of whom possess the ability and motivation to participate in an activity which provides both competition and challenge. Thus, it remains unclear whether the skill component of gambling activities or their association with masculine culture which is important. Consequently, Delfabbro and Winefield (1997) argue that further research is required to examine gender-differences in gambling motivation, specifically, what factors influence people's choice of gambling activity. For example, do women avoid playing games such as blackjack and craps as masculine games because of a reluctance to test their skills and/or compete against a dealer, because of the presence of other players, or because they are unfamiliar with the rules? Furthermore, as Delfabbro and Winefield (1996) argue, it may also be important to examine the relationship between different gambling motivations. One possibility is that women are more likely to treat gambling as an escape from worry, boredom or anxiety rather than as way of winning money. Thus, games of skill might be avoided because they defeat the purpose of the outing which is primarily for relaxation and enjoyment.

3.6.7 Conclusions: Gender and gambling

From the preceding discussion it can be concluded that gender differences do exist and that gender is one of the best predictors of involvement in certain types of gambling activity. It has also been shown that there are several plausible explanations

for these differences, all of which are based on cultural and social differences between men and women. At this point, however, it is unclear which of these explanations is most valid. Each explanation has its strengths and weaknesses and each has, as yet, little empirical support. It is possible that all these theories are correct and that a more eclectic theory needs to be developed which combines the best elements of each. This possibility is discussed in Chapter 5, 6 and 7 which examine the results of two recent survey studies conducted in the State of South Australia.

3.7. Personality Differences in Gambling Behaviour

3.7.1 Overview

As discussed in Chapter 1: although demographic factors are useful in allowing us to predict which people are most likely to gamble, they are insufficient in explaining why certain individuals gamble while others do not. People may have exactly the same demographic characteristics and the same opportunity to gamble, yet differ substantially in their attitudes towards, and involvement in, gambling. Thus, as Walker (1992a) and Griffiths (1995a) point out, it is possible that there are certain personality or dispositional characteristics which predict an involvement in gambling, independent of variations between demographic groups. For example, it has been suggested that certain people may, by nature, have an attraction for risk, chance and the excitement provided by gambling. However, as Walker also point out, there are a number of fundamental problems associated with research of this kind which must be considered before any investigation is commenced. The first is the difficulty associated with clearly identifying the direction of causality of any observed relationships. The second is trying to identify correlates of gambling behaviour which are independent of the behaviour itself.

As Walker notes, most personality research into gambling is, by nature, ad hoc. To understand how gamblers differ from the rest of the population, researchers have typically administered personality tests to groups of people involved in gambling and compared the results with those of non-gamblers or established norms for the test concerned. Although this method has proved useful in identifying the psychology of people already involved in gambling, such work tells us very little about whether the

characteristics identified are the predisposing factors for gambling, or whether they are merely the result of gambling. For example, if a sample of known problem gamblers have been classified as having low impulse control, does this imply that these people have experienced difficulties as a result of being unable to control their behaviour? The answer is that we do not know. As much as it would be tempting to reach this conclusion, it might also be the case that it is people's involvement with gambling that has led them to lose control over their behaviour. Consequently, as Walker has suggested, until longitudinal research has been conducted to examine the personality characteristics of people before and after they have commenced gambling, personality analyses are likely to be of limited value.

The second problem which Walker identifies relates to the issue of circularity. By this, he implies that some research has attempted to identify personality characteristics which are not independent of gambling behaviour itself. To say, for example, that gambling involvement is likely to be associated with people who enjoy taking risks with money and who enjoy games of chance is uninformative, and is akin to saying that an involvement in crime is predicted by a penchant for breaking the law. In other words, it is necessary that any measure which is used to predict an involvement in gambling or any other behaviour is derived independently. Findings should be falsifiable meaning that it should be possible to show that people who do not gamble also possess the characteristic identified (e.g., low ego control), so as to determine whether the characteristic is a necessary condition for gambling involvement or gambling-related problems. A failure to do this will simply result in findings which merely redescribe the behaviour in terms of itself. For example, associating gambling with 'a tendency to take risks with money' will not be meaningful because it likely that person X's risk-taking is related to gambling. Such a personality trait or characteristic would only be useful if one could show that the 'tendency to take risks with money' preceded any involvement in gambling activities. From Walker's (1992a) comprehensive review, it is clear that most researchers have been successful in avoiding problem 2. However, very little has been done to address point 1, namely, the issue of causality. Thus, while gambling researchers know a considerable amount about the characteristics of gamblers, and particularly problem gamblers, little is known about how these characteristics are causally related to the behaviour.

A further problem with this research is that it has been remarkably fragmented and inconsistent both in the type of subjects used and the personality characteristics examined. As in other areas of psychology (e.g., alcohol research, Dickerson, 1988), gamblers have been administered almost every major psychological test presently available. As a result, there are so many findings that one is left in the position of having to conclude that there are no specific personality characteristics which allow one to distinguish gamblers from non-gamblers. Instead, as Allcock (1985) and Dickerson (1989) have concluded, it appears that the only difference between those who gamble, and those who gamble excessively is the level of expenditure. For this reason, they suggest that it is more productive to study the nature of gambling behaviour itself rather than the characteristics of individual gamblers.

Nevertheless, Walker (1992a) argue that there are some personality characteristics which may warrant some investigation in future research. These include: Zuckerman's (1979) notion of Sensation Seeking, Extraversion/Introversion (Eysenck, 1967), Locus of Control (Rotter, 1966) and Desire for Control (Burger & Cooper, 1979). All four of these variables have been examined by more than one researcher and appear to have some predictive value.

3.7.2 Are gamblers sensation-seekers?

Zuckerman's (1979) notion of sensation-seeking is one of the most obvious variables to consider in the study of gambling. Based upon the work of Hebb (1955) and Berlyne (1960), sensation seeking refers to individual differences in the desire for external stimulation. According to this theory, people differ in the amount of external stimulation required to maintain an 'optimal level of arousal' or interest in everyday life. In some people, labelled low sensation-seekers, very little external stimulation is required to maintain this level, whereas in others labelled 'high sensation seekers', a greater amount of stimulation and excitement is required. People are classified into these two groups based upon the sensation seeking scale (SSS), which infers people's optimal arousal levels from the type of activity in which they choose to participate. In its current form. the scale examines people's preferences in terms of four dimensions or subscales: (1) *Thrill and Adventure Seeking*, which measures people's desire to participate in sports or other activities which involve speed or danger, (2) *Experience*

Seeking, which assesses people's need to obtain mental and sensory experience through travelling and variations in lifestyle, (3) *Disinhibition*, which refers to people's tendency to be socially and sexually uninhibited, and (4) *Boredom Susceptibility*, which refers to people's aversion to repetitious tasks, uninteresting people, routine and a lack of change.

Since early investigations showed that this scale and its subscales correlated with increased drug and alcohol use (Zuckerman, Neary & Brustman, 1970; Zuckerman, 1979), it was hypothesised that this scale might also correlate with an involvement in gambling. This was indeed confirmed in an early study by Zuckerman (1974) who found that undergraduates who volunteered for his gambling experiment scored more highly on the Experience Seeking and Disinhibition subscales than other students who did not participate. Kuhlman (1976) followed up this study by asking the volunteers to participate in several gambling activities (blackjack, roulette and craps) conducted in a laboratory session. He found a significant, but small ($r=.32$) positive correlation between the average amount wagered in the game of blackjack and scores on the Disinhibition Subscale. A similar correlation was obtained when he asked the subjects to respond to several hypothetical gambling situations in a written test. Kuhlman argued that the effect emerged most strongly for blackjack, possibly because this activity provided a greater possibility of skilful play and a sense that riskier bets would be successful. Other confirmatory evidence has been obtained by Kuley and Jacobs (1988), who found that sensation seeking scores were higher among heavy gamblers than social gamblers; Anderson and Brown (1984), who found a positive correlation between bet size and sensation seeking scores amongst people gambling on blackjack in a casino; and finally, Wolfgang (1982) who found that high sensation seekers bet more in a laboratory dice game.

On the other hand, disconfirming evidence has been obtained by: Allcock and Grace (1988) who found that problem gamblers did not score any more highly on sensation seeking than non-gamblers; Anderson and Brown (1984) who found that blackjack gamblers did not differ from non-gamblers; Ladouceur and Mayrand (1986) who found that roulette players did not differ from non-gamblers; and Blaszczynski, Wilson and McConaghy (1986), Blasczyzski, McConaghy & Fabre, 1991 and Dickerson, Cunningham, Legg-England and Hinchy (1991), Dickerson, Hinchy and Frankova

(1987) all of whom have found that gamblers, particularly heavy or problem gamblers, tend to score lower on sensation seeking compared to the general population.

In light of these findings, Walker has suggested that the relationship between gambling and SS may be curvilinear. A low level of sensation seeking is associated with less involvement in gambling, a moderate level is associated with a greater involvement, but heavy gambling is likely to be associated with lower sensation seeking scores. This may be because a heavy involvement with gambling leads people to become inhibited and withdrawn in most other facets of life. Heavy gamblers, although still involved in risk-taking, may find it difficult to endorse many items on the sensation seeking scale, especially those which relate to the need for novelty and socialisation with others. Thus, as Walker suggests sensation seeking may be a more useful predictor of the way people gamble (e.g., the size of bets, etc.) rather than of involvement in gambling per se. Therefore, a goal of future research may be to examine the physiological or psychological mechanisms that underlie the associations which have emerged. For example, if sensation seeking is related to increased risk taking and sensation seeking is based upon the need to elevate arousal levels, one logical prediction is that high sensation seekers should experience a greater arousal increase between the time they commence gambling and while gambling. These differences in arousal should then be examined in relation to the level of risk-taking. In this way, a stronger test can be made of the principles which Zuckerman has developed.

3.7.3 Extraversion as a predictor of gambling

To a large extent, work on extraversion is very similar to that conducted using the sensation seeking scale. Extraversion, as described and measured by Eysenck (1967 is also a measure of the extent to which people require external stimulation to maintain optimal levels of arousal. According to Eysenck, people differ in terms of their habitual level of cortical arousal and this influences their ability to form conditioned responses, their sensitivity to rewards and punishment and the types of activity they prefer (Brebner & Cooper, 1974; Brebner, 1983; Walker, 1992a). Introverts are people who are generally highly cortically aroused. They require very little stimulation to reach an optimal level of arousal, are unable to sustain responses for a long period of time and a

less response orientated (Brebner & Cooper, 1983). They prefer quiet, solitary activities, dislike taking risks and avoid noisy environments. Introverts also rapidly form conditioned responses, but they are very susceptible to punishment Gray (1981) and are less sensitive to reward. By contrast, extraverts are people who have lower habitual levels of arousal, are: more response orientated (Brebner & Cooper, 1974), more sensitive to reward, more immune to punishment, and have a tendency to enjoy taking risks and acting on impulse. Given these characteristics, it would be logical to expect that extraverts would have a greater interest in gambling than introverts

Unfortunately, as Walker (1992a) discusses, the promising face validity of extraversion as a possible predictor of gambling involvement has not been borne out by the research findings. Although some studies of problem gamblers have shown higher levels of extraversion (Roy, De Jong, & Linnoila, 1989; Seager, 1970; Wong, 1980), other studies have shown no difference at all (Blaszczynski, Buhrich & McConaghy, 1986; Moran, 1970a; Ladouceur & Mayrand, 1986-NB. using non-problem gamblers), whereas other studies have found problem gamblers to be lower on extraversion (Blaszczyzski, Wilson & McConaghy; Koller, 1972). The problem with this work, as Walker points out, is that nearly all the research has been conducted using problem gamblers in treatment. One simply does not know how extraversion might be related to gambling amongst the rest of the population. Moreover, it is uncertain whether the differences observed are the result or the cause of the gambling. As with sensation seeking, it is likely that problem gambling is associated with a withdrawal from other parts of life, the loss of social connections. Although extraversion may be related to the initial involvement with gambling, this relationship may be obscured once the gambling reaches a certain level, with people becoming increasingly introverted as a result of losing money, friends and their families.

A further difficulty with this research is that no attempt has been made to control for the type of gambling involved. As already noted in Chapter 2, there are some types of gambling which require less social interaction and risk-taking than others (e.g., lotteries, bingo), and some which are just the opposite (e.g., blackjack). Therefore, it is possible that that the relationship between extraversion and gambling depends upon the type of activity involved. Extraverts may prefer activities which allow the possibility for social interaction, whereas introverts may prefer more solitary activities, e.g.,

gaming machines or lotteries. If this proved to be so, it would cast doubt upon the assumption of a clear association between this personality construct and an involvement in gambling per se.

3.7.4 Locus of Control

The term locus of control is based upon the work of Rotter (1954; 1966). According to Rotter, people differ in the extent to which they believe they can influence their environment or circumstances. Those who have been previously successful in obtaining reinforcement or rewards as a result of their own actions develop the belief that similar skills can be applied to similar situations in the future. These people (called 'internals') believe that actions and outcomes are governed by 'internal' factors such as skill, talent and hard work, and that people are largely responsible for their own failures and success. By contrast, there are others who have not been successful in influencing what happens in their lives. Such people, termed 'externals', come to believe that outcomes are determined by forces beyond their control such as fate, luck, and powerful others, where success is not a matter of hard work or talent, but good fortune and favourable circumstances.

An important finding of this research is that locus of control appears to be related to people's preferences for activities. As Rothbaum, Weisz and Snyder (1982) note, people have a "...preference for activities which are congruent with their generalized expectations for control". (p.18). Those with an internal locus of control prefer tasks that allow the demonstration of skill or ability, whereas externals prefer activities where the outcomes are a function of chance (Davis & Phares, 1967; Lefcourt, 1966; Rotter & Mulry, 1965; Schneider, 1968; 1972). As a result, it was hypothesised that a more external locus of control would be associated with a greater involvement in gambling. This prediction has been supported by several studies. For example, higher externality has been observed in problem gamblers (Johnson, Nora, & Bustos, 1992; Moran, 1970a; Wong,1980); in heavy gamblers (Devinney, 1978); in racing punters (Kusyszyn & Rubenstein, 1985); and in Hong Kong lottery gamblers (Hong & Chui, 1988). However, inconsistent results have been obtained by Glass (1982) who found that the locus of control scores of pathological and social gamblers were no different from those of non-gamblers; Ladouceur and Mayrand (1986) who found that roulette

players were no more external than non-gamblers; Kusyszyn and Rutter (1985) who found that heavy and occasional gamblers were no different from non-gamblers; and finally, Carroll and Huxley (1994) who found that male adolescent slot machine players in the U.K. were significantly more internal that non-gamblers.

One reason for these inconsistencies is that, unlike many chance-determined laboratory tasks, not all gambling activities are chance-determined to the same extent. As shown in Chapter 2, although chance is an inevitable feature of all gambling activities, there are some activities which allow players to influence the outcomes using skilful play (see Table 2.1 or Figure 2.1). Thus, it may be that the strength of the association between external locus of control and gambling will vary according to this structural characteristic. For those who prefer activities which are purely chance determined, an external locus of control would be expected, whereas an internal locus of control should be more associated with a preference for skilled gambling activities.

This hypothesis was confirmed by Lester (1980) who administered Rotter's (1966) locus of control scale to a group of university undergraduates and found that an external locus of control was associated with an involvement in chance activities such as roulette, slot machine and lotteries, but not table poker. Unfortunately, subsequent attempts to vary this finding using samples of gamblers has proved unsuccessful. For example, Jablonski (1985), found no difference in the locus scores of sport betters (a skilful activity) and lottery gamblers. Similarly, Kusyszyn and Rubenstein (1985) showed high externality to be associated with horse racing (a skilled type of gambling), whereas Carroll and Huxley showed an internal locus to be associated with slot machine gambling (a chance activity). Therefore, it can concluded that locus of control is, at best, an inconsistent predictor of gambling involvement, and that there are difficulties associated with establishing a clear link between this variable and an involvement with gambling in general.

3.7.5 The Desirability for Control (DC) Scale

The Desirability for Control or DC scale was developed by Burger and Cooper (1979), Burger (1984, 1989). Based upon the early work of Adler (1930), Kelley (1955) and White (1959), the scale was designed to measure people's motivation to obtain control over events in their lives, and included such items as 'I enjoy making my

own decisions', 'I enjoy having control over my own destiny'. People who scored highly on this scale were classed as active, self-directed and decisive, whereas low scorers were seen as passive, indecisive and nonassertive. While Burger and Cooper (1979) acknowledged the obvious similarity of this concept to Rotter's (1966) concept of locus of control, they also showed that there were differences between the two scales. Specifically, whereas a locus of control is based upon people's expectations for success based upon previous experiences, the Desire for Control Scale measured people's current motivation to achieve control. Thus as Burger and Cooper found, it was possible for people to have an internal locus of control, but low desire for control and, conversely, an external locus of control and a high desire for control.

In their first study (Burger & Cooper, 1979), used the DC scale to investigate betting behaviour in a laboratory card-guessing game. In this game, a card suit was nominated and subjects had to lift up a card matching that suit from 8 cards placed faced down on a table. The study had two conditions. In the 'control' condition, subjects were allowed to shuffle the 8 cards and place them on the table before placing a bet and choosing a card. In the 'no-control' condition, the cards were placed and chosen by the experimenter. The subject only had to bet on whether the card selected matched the nominated suit. As predicted, there was a significant interaction between DC scores and the amount wagered. High DC subjects bet significantly more in the 'control' condition. This confirmed Burger and Cooper's expectation that high DC scorers would be more sensitive to conditions that signified the possibility for control. This study was replicated by Wolfgang, Zenker and Viscusi (1984), but did not support Burger and Cooper's finding. Although high DC scorers bet more in all conditions consistent with a greater perception of control, the amount bet in the 'control' condition was not significantly greater than that in the 'no control' condition.

In a second study, based upon Lester's (1980) findings using Rotter's (1966) Locus of Control Scale, Burger and Smith (1985) investigated whether DC would be related to the type of gambling activity preferred. Specifically, it was predicted that high DC scorers would be more likely to choose skilled games where control was possible, whereas low scorers would prefer chance games. This prediction was confirmed using a sample of 36 problem gamblers in Gambler's Anonymous. It was found that high DC scorers were associated with more skilful activities such as sports betting, horse racing,

poker and card games, whereas low DC scores were associated with an involvement in lotteries and slot machine and roulette playing. Another finding was that the problem gamblers with the highest DC scores had lost significantly more money in their worst year of gambling, (c.f. Wolfgang et al.'s finding in the laboratory). However, contrary to predictions, problem gamblers did not score higher on the DC scale than a comparison group of undergraduate students. Instead, the problem gamblers' scores were significantly lower.

Burger and Cooper's explanation for this anomalous result was very similar to that offered by Walker (1992a) in relation to sensation seeking (SS) scores. Both these variables appear to predict a people's involvement with gambling and also the typical amount spent (i.e., the level of risk taking), but neither variable appears to be a reliable predictor of gambling problems. Just as problem gamblers become more inhibited and score lower on sensation seeking, it also appears that their sense or motivation for obtaining control decreases. Thus, as Walker (1992a) concluded with the SS scale, it is likely that the relationship between DC and gambling is curvilinear. A higher desire for control may be associated with an attraction to more skilled gambling activities. However, the experience of losing money as a result of heavy, possibly uncontrolled gambling leads to a negative association between DC scores and gambling involvement.

Finally, in more recent research, Burger and Schnerring (1982) examined the relationship between people's desire for control and the way in which they gamble. His prediction was that those with a high DC would be more likely to employ strategies when they gambled, whereas those who had low DC scores would be more likely to use luck. To examine this, Burger compared the gambling habits of a group of lottery and bingo players. Consistent with expectations, it was found that lottery players with high DC scores were significantly more likely to pick their own numbers rather than receiving a 'random-pick' by the computer. It was also found that club bingo players with low DC scores were significantly more likely than high DC scorers to engage in superstitious rituals and to bring along lucky charms when they gambled.

In conclusion, Burger's studies provide persuasive evidence that variations in control motivation may play a role in gambling. However, despite these positive results, it is unlikely whether even this variable which be useful in understanding the nature of

problem gambling. As in other cross-sectional personality research, it is not possible to determine whether any observed differences are the cause or the result of the gambling. It is possible that, as with sensation-seeking and locus of control, the relationship between gambling involvement and control motivation is curvilinear; but this remains speculative and is based upon cross sectional comparisons. Again, it is suggested that a longitudinal study that measured control scores across time, preferably before and after the commencement of gambling would be the only effective way in which to establish the true direction of causality. As Walker (1992a) points out in relation to locus of control: 'if such a relationship is a reality, then it is just as likely that the gambling causes the trait as that the trait causes the gambling.' (p.100). Problem gamblers may have a lower DC score as a result of repeated failures to control their behaviour, rather than low DC scores having caused or preceded their involvement. For these reasons, even this variable is unlikely to contribute substantially to explaining the etiology or maintenance of gambling behaviour.

As a result of these problems, little emphasis will be given to personality differences in this project. Although it is acknowledged that personality factors may sometimes influence the nature or magnitude of responses to gambling, e.g., the extent to which people believe they can influence outcomes of gambling activities, or the amount of arousal which develops, these effects are likely to be relatively small. Instead, following the suggestions of Allcock (1985), it will be argued that a greater understanding of gambling will be obtained by studying the nature of the behaviour itself rather than the characteristics of the gamblers. This issue is considered in greater detail in the following chapter (Chapter 4) which examines the theories which have been advanced to explain the onset and persistence of gambling behaviour.

3.8 Summary of Chapter 3: Predictors of Gambling Involvement

Table 3.1 provides a summary of the research findings discussed in this chapter.

Table 3.1: General predictors of gambling involvement

Variable	General Findings
(1). Demographics	
(a). Gender	-women are just as likely to gamble as men. -women gamble on a narrower range of activities. -women under-represented in Casino games, racing and sports-betting, but over-represented in bingo games. -women spend less on gambling. -women are less likely to be problem gamblers.
(b). Age	-people start gambling when they are 9-10 yrs. old. -gambling participation is negatively related to age. -problem gamblers tend to be middle-aged in the in U.S., but younger in Australia.
(c). Socio-economic Status/ Income	-early research showed gambling involvement to be highest in lower S.E. groups. -more recent research shows gambling involvement to be highest in middle-class people. -gambling problems highest in low income groups, or those who are unemployed.
(d). Religion	-gambling more common in Catholics than in Protestants.
(e). Marital Status	-gambling involvement highest among single people, particularly those with low incomes. -gambling involvement lower in widowed people (NB. confounded with age).
(2). Personality Variables	
(a). Sensation-seeking	-research suggests a curvilinear relationship between sensation-seeking and involvement. Regular gambling involvement is associated with moderate SS scores, but problem gamblers tend to score lower on the measure.
(b). Extraversion	-inconsistent evidence. A few studies have found gamblers to be more extraverted.
(c). Locus/Desire for Control	-some evidence to suggest that internals prefer skilled games, externals prefer chance games. -problem gamblers tend to be more external. -desire for control related to gambling preference. High DC scores prefer skilled games, low DC scorers prefer chance games. -problem gamblers lower on DC-suggests curvilinear relationship between DC and level of involvement.

Chapter 4

Theories of Gambling Behaviour

4.1 Overview

Although the subject of gambling behaviour has been of interest to researchers for many years, there still remains considerable speculation about why people are willing to persist with an activity which is both unproductive and unprofitable. As will be recalled from Chapter 2, researchers have generally attempted to answer this question in one of two ways. On the one hand, there are those who have argued that people gamble for reasons other than to make money such as, for example, to obtain enjoyment, excitement or relaxation, whereas, on the other, there are those (e.g., Walker, 1992a) who remain convinced that winning money is the central motivation for gambling.

While results from numerous surveys of gambling motivation have tended to support both perspectives, showing that people gamble for both financial and non-financial reasons, such measures may not always be reliable. This is because people may often not be aware of the true motivations underlying their behaviour (Nisbett & Wilson, 1977). Instead, people tend to provide answers which are 'consistent with socially agreed explanations' (Walker, 1992a, p. 91), or which convey a favourable impression to the investigator. People may be reluctant to admit that they expect to make a profit from gambling when they know that this is unlikely, and they may understate their gambling expenditure so as to avoid appearing foolish or irresponsible. Thus, as Walker (1992a) emphasises, increasing attention has instead been directed towards explaining the nature of *in vivo* gambling behaviour. Although a lot of this research has still relied heavily upon retrospective self-report data, the importance of this limitation has been reduced by obtaining self-report data in the context of ongoing gambling sessions. The purpose of this chapter is to provide a critical summary of this research. Commencing with a brief discussion of early psychoanalytic and behavioural perspectives, this chapter will examine the contribution of psychiatry, addiction research and other psychological theories to the study of gambling.

4.2 Psychoanalytic Theories of Gambling

Although systematic research into real-life gambling did not begin until the late 1970s and early 1980s, gambling has been studied by psychologists for more than 60 years. This work began in the 1920s with the publication of two articles: 'Psychoanalysis of the Gambler' by Simmel (1920), based upon the observation of gamblers receiving psychoanalytic treatment, and 'Dostoyevsky and Parricide' by Freud (1928) which was a historical case study of the Russian author Dostoyevsky, a noted 19th century gambler. According to these authors, gambling could be understood in psychoanalytical terms as a form of 'regressive' behaviour, not dissimilar to masturbation, which develops as a result of 'fixations' to the erotic stimulation associated with (presumably) the phallic stage of development. Gambling, as with masturbation, is seen as an impulsive and pleasurable activity which people find difficult to resist, but one also associated with depression and guilt. People gamble with the intention of being punished (i.e., losing), and this is regarded as an inevitable and anticipated part of the gambling process.

On the other hand, a contrasting view propounded by Bergler (1957) and Maze (1987) is that excessive gambling develops as a result of an unconscious desire for omnipotence. According to this view, children whose desires are thwarted during early infancy grow up with an exaggerated sense of frustration. Having been disappointed by their parents, these people try to compensate for this perceived lack of attention during adulthood by developing unrealistic expectations of control and influence, even over things which cannot be controlled. As Bergler argues, gambling is one activity or situation where this is likely to occur. This is because gambling is both gratifying and frustrating. Gamblers enjoy and seek the thrill of winning and playing, but they also grow angry and frustrated when they fail to obtain the rewards they desire. As a result, the poker machine, the roulette wheel or cards come to be identified with the mother-figure of childhood in that they are also entities which can satisfy the gambler's desires, but which will also punish him for engaging in an activity which he (unconsciously) knows to be shameful.

As Walker (1992a) points out, many of these ideas appear to be very consistent with behaviours commonly observed in problem gamblers (e.g., the high incidence of anxiety, depression, despair and false optimism). However, as most researchers (e.g.,

Dickerson, 1984, 1989; Griffiths, 1995a; Walker, 1992a; Wildman, 1991) also suggest, it is doubtful whether these theories will significantly advance our existing knowledge of gambling behaviour. This is because of the problems associated with trying to confirm or disconfirm these ideas empirically. Neither theory explains why people initially decide to gamble, nor do they explain why one person will be able to maintain control over his or her gambling while another person cannot (Griffiths, 1995a). In addition, as Rosenthal (1986) has pointed out, attempts to infer the existence of unconscious guilt and hidden frustration will always be confounded by the fact that such feelings will arise anyway as a consequence of heavy gambling. Thus, as Griffiths has suggested, these psychoanalytic accounts of gambling behaviour, although interesting, are perhaps best regarded as an interesting historical background to the study of gambling, rather than as an important source of ideas for future research.

4.3 Operant Conditioning and Gambling

4.3.1 Operant Conditioning: Overview

In contrast to the psychoanalytic account, the behaviourist theory of gambling behaviour has been the subject of a some empirical research. This work began with the early studies of Skinner (1953) and Ferster and Skinner (1957, 1969, 1974), who suggested that gambling behaviour could be understood in operant terms. Gambling, in particular slot machine gambling, was seen as a schedule-induced behaviour maintained by intermittent schedules of reinforcement, most likely a 'variable-ratio' schedule, which involves the provision of infrequent rewards after a certain random number of responses. Organisms trained on this schedule produce a very rapid rate of response because they 'know' or sense that the amount of reward received is dependent upon the number of responses. Thus, the more frequent the responses, the more frequent will be the rewards, with the possibility that each subsequent reward will only require a minimum number of responses. Skinner argued that people find it difficult to stop responding on these schedules because they become accustomed to the infrequency of reward. Rather than regarding a long series of losses on the roulette table or slot machine as a disincentive for reward, people continue to respond (gamble) because they feel that the periodic win (or payout) is getting closer.

4.3.2 Studies of Slot Machine Gambling

Preliminary work in the 1950s generally supported these ideas. For example, in one of the first studies using a slot machine[1], Lewis and Duncan (1958) investigated the effects of varying levels of reinforcement upon the persistence of behaviour. In their study, subjects were asked to complete a number of acquisition trials in which 33%, 66% or 100% of the trials were reinforced. Subjects were then asked to play the slot machine for as long as they liked. Unknown to the subjects, this second period was an extinction schedule (i.e., with zero rewards). As predicted, it was found that the subjects with the lowest percentage of reinforcement during the acquisition trials persisted longer than the other two groups. This was consistent with Skinner's theory that the degree of resistance to extinction would be inversely related to the previous frequency of reinforcement. However, as Dickerson (1979) pointed out, some doubts must be raised about the validity of these findings because of the artificiality of the experimental design. Unlike in real gambling, where it is possible to win or lose money, Lewis and Duncan's subjects were given an unlimited supply of tokens and had very little to gain from winning, and this limited the extent to which these results could be generalised to real-life gambling.

In order to overcome this problem, Levitz (1979) undertook a similar study, but allowed subjects to gamble with their accumulated winnings and participation fee. Again, consistent with operant principles, he found that subjects who experienced a large win in the first few trials found it more difficult to stop gambling when they were losing. This result suggested that gambling persistence appeared to be predicted not only by the person's tolerance of infrequent reward (Lewis & Duncan, 1958), but also the saliency of early wins. People would be more likely to accept losing streaks if they sensed that winning *was* possible. Moreover, this result was also consistent with Bolen and Boyd's (1969) observation that problem gambling is often associated with large wins early in the gambler's career.

The role of reinforcement schedules in slot machine gambling received little research during the late 1970s and early 1980s. However, interest in the topic increased during

[1] Note: Although fruit or poker machines are said to be maintained by a variable-ratio schedule, it is more correct to describe the schedule as a 'random-ratio schedule' (Hulburt, Knapp, & Knowles, 1980). This is because the 'seed' number used to determine the randomly produced outcome is not fixed as is usually the case in laboratory studies, e.g., Ferster and Skinner (1957).

the 1980s and 1990s with the work of Dickerson and his associates in Australia, who attempted to examine the applicability of operant principles to regular gamblers in field settings (i.e., poker machine clubs). The methodology for these studies was developed by Dickerson, Hinchy, Schaefer, Whitford and Fabre (1988) and was subsequently employed in several studies (Dickerson, Hinchy, Cunningham & Legg-England, 1991; Dickerson, Hinchy, Legg-England, Fabre & Cunningham, 1992). In each study, poker machine players were accompanied by an observer to a venue of their choice. They were allowed to choose whatever machine they liked, change machines, change money, have drinks, speak to friends as in any normal session of gambling. While the person played, the observer used a hand-held computer to record response rates, bet-sizes, physiological data and expectancies of winning.

The significant finding of this research was that the response rates of poker machine players appeared to be sensitive to the pattern of reinforcement. Specifically, it was found the regular players (once per week or more) would increase their rate of response in relation to small wins (less than 50 credits), but reduce their rate of response after having obtained a large win (more than 50 credits). Dickerson et al. obtained this effect by calculating the average rate of response rates within minutes containing only small wins or at least once large win. These response rates was then compared with those in subsequent minutes. Using time series analysis, Dickerson et al. showed how these events affected response rates up to two minutes later. On the basis of these findings, Dickerson et al. concluded that regular poker machine gambling is strongly influenced by schedules of reinforcement or what may be termed 'machine events'. In addition, the fact that these effects were more observed among regular gamblers suggested that regular gambling is a highly stereotyped habit, with people's behaviour becoming more and more influenced by factors beyond their control.

However, there are two methodological limitations of these studies which need to be considered before more confident conclusions can be drawn from the findings. First, because different gamblers played for different lengths of time (e.g., mean=70 minutes for regular gamblers, and men=30 minutes for occasional players), it is possible that some occasional gamblers did not play long enough for the 'stereotyped patterns' to emerge. Indeed, this question can also be raised in relation to the 1992 study which involved 10 high frequency gamblers. A careful study of the results revealed that 7 out

of 10 showed a sensitivity to small wins (i.e., response-rate increases), 7 showed a sensitivity to big wins (i.e., response-rate decreases), but only 3 or 4 players displayed both. Given that the session length ranged from 39 minutes to 122 minutes, is it possible that those players who showed less stereotyped responding were also the ones who gambled for a shorter time? Because Dickerson et al. did not provide this information, this question remains unresolved. However, even if one assumes that session length had no influence upon behaviour, Dickerson's results suggest that stereotyped response patterns are not always a consistent feature of the behaviour of all regular poker machine players, since only 30 to 40% of them change their response rates in relation to both large and small wins.

A second problem with Dickerson et al's study concerns the measures of expectancy and subjective excitement taken during the course of the game. These measures were taken every 5 minutes and after every big win (50+ credits) and required the player having to stop gambling for at least 15-30 seconds. As Walker (1992a) has suggested, it is possible that this interruption may have been partially responsible for the observed decreases in response rates, because filling in the scales may have been sufficient to draw the player's attention away from the activity thereby breaking the natural flow of the game. He suggests that Dickerson et al.'s findings may need to be reconsidered with this confounding factor removed, so that the effects of large reinforcements can be more clearly interpreted.

4.3.3 The Role of Incidental Reinforcements

A further difficulty with the behavioural account is determining the exact source of the reinforcement. In the studies cited above, reinforcement is considered synonymous with obtaining additional credits or coins, and it is argued that the intermittent nature of this reward is what strengthens the behaviour. However, as Allen (1992), Griffiths (1993c) and Walker (1992a) have pointed out, one must also consider the nature of reinforcement itself. Poker machines are able to maintain the interest of patrons despite long periods without reward because the reinforcements (when they do occur) are extremely potent. On traditional lever-pull machines, the occurrence of wins is accompanied by the sound of coins crashing down into a metal containers which will be audible for metres around. Simultaneously, a number of coloured lights and sound-

effects are activated. The player becomes the focus of attention and perhaps of admiration by fellow players. Thus, the various stimuli which accompany the experience of winning are likely to be as reinforcing for the player as the win itself, and may, in addition, serve to provide vicarious reinforcement for other players in the vicinity, in this way strengthening their conviction that their own machine may soon provide similar rewards.

Griffiths (1993c) argues that these principles apply even more strongly to modern electronic machines. To increase the appeal and excitement of slot machine gambling, manufacturers have spent a considerable amount of time and effort in the design and marketing of machines. Machines are, for example, given exciting names that emphasise winning, luck or striking it rich (e.g., Fortune Trail, Silver Chance) and use symbols which they know will be attractive to players (e.g., gold coins, palm trees, bags of gold, etc.). Bright, arousing colours such as red and yellow are used on the machines rather than more peaceful colours such as blue or green, and pleasant music or sound effects are produced whenever a win occurs so as to increase its salience.

The suggestion is that not all machines are equally appealing than others. The fact that one might be more appealing than others may have nothing to do with the intermittent nature of reinforcement. Two machines may have identical patterns of reinforcement, but one machine may be rarely used, or else rarely maintain the interest of the player merely because of the nature of the reinforcing stimuli. As will be explained later, this is why any research into the nature of poker machine gambling should always study people gambling on their preferred machines. People are likely to persist longer on machines with which they are familiar or which they prefer, irrespective of how the payout of this preferred machine might compare with others.

4.3.4 The Role of Near Misses in Slot Machine Gambling

Another factor which both Walker (1992a) and Griffiths (1990a; 1995a) have emphasised is the role of what are termed 'near misses', which refer to the occurrence of outcomes which are very close to the one desired (Griffiths, 1990a; Reid, 1986). As Reid (1986) has pointed out, these events may be highly reinforcing for players because it is very easy for players to imagine what would have happened if the outcome had been slightly different. He argues that many of these missed chances will

be interpreted as 'near-wins', and may increase players' interest in the game. Having observed an outcome that is close to winning, players may become more confident that the machine will soon payout, or that winning is possible. Alternatively, near-misses may act to increase the excitement of the game, or create a sense of frustration (Amsel, 1958) or regret (Loftus & Loftus, 1983) that can only be resolved by further gambling.

In order to investigate the effects of near-misses upon slot machine gambling, Strickland and Grote (1967) conducted a study using a rigged slot machine that allowed the experimenter to vary the relative frequency of near-misses. This was achieved by varying the percentage of winning symbols which appeared on the first reel. One group of players received a higher percentage of near-misses, the other a low percentage. As predicted, the high-frequency group persisted significantly longer than the low-frequency group. Although a subsequent attempt by Reid (1986) to replicate this result proved to be unsuccessful, the difference between the two groups was in the expected direction.

Despite the inconsistency of these results, Griffiths and Walker remain convinced that near misses do play a role in poker machine gambling, and that this is particularly likely to be the case on modern machines which have up to nine different payout lines. On modern machines, players not only win when the symbols line up on the three horizontal rows, but also if these patterns are obtained along the diagonals, in zig-zag patterns. Furthermore, players can obtain money from what are termed 'scatter wins', which are obtained when a sequence of winning symbols is obtained across all three lines (see Figure 4.1).

The effect of having multiple payout lines is that it increases the probability of players being reinforced. With so many different patterns and combinations, it is likely that there are very few spins in which the player is not close to at least one winning combination! For this reason, Griffiths suggests that it may be extremely difficult for researchers to identify what constitutes a near-miss from the players' point of view. What may seem close to one player might be deemed a clear miss by another. Thus, it is likely that the process of studying the unique effect of near misses will be extremely difficult. Future studies of this topic, he argues, will probably need to use video-tape recording rather than bystander observation so as to allow a more detailed identification and analysis of the effects of near-misses. Alternatively, researchers could

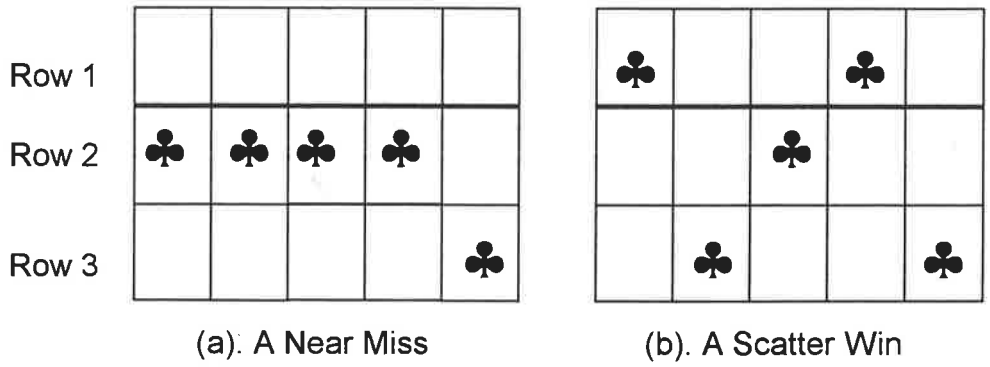


Figure 4.1 Example of a 'near miss' and 'scatter win' on a 5-reel machine

use a preprogrammed slot machine that varied the number of near-misses in conjunction with a constant number of wins. Behaviour could then be compared between groups using a varying percentage of obvious near-misses.

4.3.5 Operant Conditioning and Other Types of Gambling

Although poker machines provide the most obvious illustration of the role of reinforcement schedules, Skinner argued that these principles could be usefully applied to all forms of gambling. This was because all types of gambling were based upon similar processes, namely, the pursuit of wins in the context of infrequent rewards. However, as Dickerson (1993) and Walker (1992a) have recently argued, this assumption does not appear to be entirely valid because of the varying structural characteristics of different types of gambling. Since operant principles are generally more concerned with explaining ongoing, or persistent, behaviour, it is logical to expect that they will be more applicable to those activities which allow a more rapid, or continuous (see Table 2.1 or Figure 2.1) rate of response (Walker, 1992a). Thus, as Dickerson (1989; 1993) suggests, while it is unlikely that lottery gambling is a schedule-based behaviour, schedules may play a role in most other types of gambling.

In order to investigate this possibility, Dickerson (1977, 1979) conducted a series of studies in off-course betting agencies in the English city of Birmingham. His aim was to attempt to identify the various aspects of the gambling environment which might act as reinforcements. In these agencies, gambling was based around a series of race commentaries which occurred at fixed intervals throughout the day. Players entered

the agency, studied the form guide and then had several minutes to place their bets before the 'off', viz., the time after which no more bets could be placed. During this period, players would have the opportunity to choose horses, listen for changes in the odds, hear reports of scratchings, and so forth. The aim of Dickerson' study was to examine how soon before the 'off' patrons would place their bets, in particular, whether there would be any difference between the betting behaviour of regular and non-regular players.

His results showed that regular players were significantly more likely than the non-regular players to place their bets just before the 'off'. Indeed, if one plotted the cumulative percentage of bets made by regular players against the time before the 'off', a distinctive scallop pattern emerged, which was consistent with the pattern of responding typically observed on fixed-ratio schedules (Ferster & Skinner, 1957). From this, Dickerson concluded that gambling on horse-races may be maintained by two separate schedules of reinforcement: firstly, by the pattern of occasional wins obtained from the outcome of betting (i.e., a variable-ratio schedule), and secondly by the excitement associated with the anticipation of the race commentary (i.e., a fixed-ratio schedule). Although, as Dickerson concedes, these findings are problematic in that the scalloped pattern was based upon group data rather than individual responses (as is always the case in operant studies), Dickerson concluded that regular gambling on horse-races appears to be strongly influenced by stimulus events.

This view that operant principles can be applied to most types of gambling has also been documented by Moran (1970a), who argued that many types of gambling were deliberately designed using operant principles. For example, in the same way as slot machines were redesigned to increase player interest by providing more frequent reinforcements, and more frequent near-misses, other types of gambling incorporated these modification as well. For example, bingo or 'scratch-tickets' which involve scratching or lifting panels on tickets to reveal hidden symbols, were altered so as to produce more frequent reinforcements and near-misses. Rather than obtaining a large win, or no win, as was the case when the tickets were first designed, players had the opportunity to obtain many smaller prizes and often obtained at least one or two winning symbols to give them the impression that they were close to winning.

Indeed, in a recent laboratory study, Chantal, Vallerand, Ladouceur and Ferland (1996) have shown how this process can be extended to the game of roulette. In this study, three groups of subjects were asked to play 35 trials on a simulated game of roulette. The game was designed so as to provide no wins, but a varying percentage of near-misses, which were outcomes three or fewer units from the numbers chosen by the subject each spin. In group one, there were no near misses; a second group received 33% near misses, whereas a final group obtained 67% near misses. Once each group had completed the trials, they were asked to rate their motivations for gambling, anticipation of further wins and their level of optimism. It was found that the 33% group rated themselves as significantly more optimistic and motivated than the other two groups. This result suggested that a moderate percentage of near-misses appears to reinforce gambling behaviour, but that this effect decreases as the percentage of near-misses increases.

Although no explanation was provided to explain the reduced optimism observed in the 'high near-miss group' and why a curvilinear relationship emerged, two hypotheses can be advanced. First, a very high percentage of 'near-miss' events (e.g., on 67% of trials) might have seemed too much of a coincidence and led players to suspect that the task was rigged, or non-random. A second possibility was that frequent near-misses may have engendered feelings of frustration and anger which were reflected in a reduced desire to continue gambling. Clearly, further research is required to examine this issue, preferably in ecologically valid situations where people are gambling with the real chance of winning or losing money.

4.3.6 Operant Conditioning and Superstitious Behaviours

Another area of gambling where operant theory may be of value is attempting to understand many of the irrational behaviours produced during gambling sessions. Such behaviours include: superstitious rituals, bringing lucky charms to gambling venues, wearing certain garments or personal items during gambling sessions, or believing that skill is possible in purely chance-determined tasks. According to Oldman (1974) and Henslin (1967) this behaviour can be explained in terms of Skinner's (1938) notion of 'superstitious behaviour'. In the same way that animals tend to repeat actions which are contemporaneous with the receipt of reinforcement, gamblers also try to ascertain

the unique conditions prevailing whenever they obtain a success or failure. This behaviour has been observed in slot machine players (Walker, 1988), roulette (Oldman, 1974) and also in craps (Heslin, 1967).

For example, in Oldman's (1974) study it was found that when players obtain a particular good winning sequence, or bad losing sequence, they try to understand why. They begin to ask questions: Was the croupier the same? Were they playing on the same table? Who was at the table on each occasion? Were certain numbers coming up more frequently than others? Having obtained answers to these questions, players then use this information to inform their subsequent gambling, including their choice of table, preferred croupier, and betting strategy. Similarly, as Henslin found, in an observational study of craps playing in Chicago, players held many irrational beliefs about how the dice should be shown to increase the likelihood of winning. For example, it was believed that throwing the dice hard would yield higher numbers and that softer throws were associated with lower numbers, or that shaking or kissing the dice before each throw increased the likelihood of winning. As Henslin pointed out, there was no evidence to suggest that these strategies worked, but these behaviours developed as a result of coincidental associations. If people had thrown the dice hard and obtained the desired high numbers on several occasions in the past, they would come to believe that this behaviour was essential for winning. Even though this strategy might not always work subsequently, it would, nevertheless, be maintained because of the strong reinforcing 'power' of intermittent schedules. As Henslin writes:

> *... behavior arises adventitiously; being reinforced it is informally taught in a social situation and accepted by the members; and being occasionally reinforced on a variable ratio reinforcement schedule, it maintains itself.*" (1967, p. 329)

Henslin argues that superstitious behaviour is important because it may explain why people persist with activities which provide no objective chance for success. Superstitious beliefs increase the player's expectation that gambling outcomes can be influenced, and this may strengthen the person's desire to continue gambling. Indeed, as will be discussed later in this chapter, superstitious learning may be one of the central processes underlying the development of the illusion of control, which refers to

a subjective expectation of success which is greater than the objective probability of success.

Although most researchers appear to support the idea that superstitious beliefs are the result of coincidental associations between events, a further point suggested by Wallace, Singer, Wayner and Cook (1975) is that these behaviours may also arise as a natural consequence of intermittent reinforcement. This is based upon Falk's (1971) observations that intermittently reinforced animals tend to produce an array of unusual, or 'irrational' behaviours, including increased exploration, rearing, motor movements, and excessive eating and drinking. In order to investigate this possibility, Wallace et al. (1975) asked a groups of student gamblers to play a simulated poker machine under laboratory conditions. Consistent with predictions, the results showed that people placed on a FI-60 schedule of reinforcement produced significantly more incidental motor responses than those on a FI-5 schedule (i.e., with more frequent reinforcements). Thus, it is possible that similar processes may occur in real-life gambling. The experience of infrequent reward leads to an increase in miscellaneous behaviours some of which may become part of the gambler's behavioural repertoire if they happen to occur at the same time as a winning outcome. So far no research has been conducted to investigate this possibility.

4.3.7 Summary and Critique: operant research

Operant conditioning was suggested as a possible explanation for gambling because of the similarity between the pattern of reinforcements provided by gambling games and a variable ratio schedule of reinforcement (Ferster & Skinner, 1957; Murray, 1994; Dickerson, 1984). The analysis above shows that this notion is only partially supported by research. Although operant principles have been successfully applied in the design of some gambling games and appear to play a role in slot machine gambling, their application to all types of gambling appears problematic. In activities where there is a long interval between wager and outcome, and where there is a possibility for skilful play, Walker (1992a) argues that other factors are likely to be involved. Such factors include the players' beliefs about the likely pattern of outcomes and the extent to which players believe that they can influence the outcome by skilful playing (Holden & Rotter, 1962; James & Rotter, 1958; Rotter & Mulry, 1965), or predict the outcomes.

For example, as Walker (1992a) notes, roulette and two-up players often feel reluctant to keeping betting on the same outcome if it has won too many times in a row. They believe that the outcome will change in accordance with the law of averages, so they change their bets accordingly (e.g., from tails to heads, black to red, etc.). This common behaviour is inconsistent with the predictions of operant conditioning which would suggest the opposite. Players should bet on the outcome which has provided them with more frequent rewards.

More generally, there are difficulties in using operant principles to explain people's long term commitment to gambling. Why do people persist with the behaviour when they inevitably lose more than they win? Moreover, how can this theory account for the occurrence of relapses? Why do people recommence gambling after intervals of five or more years? Behaviourists might argue that these phenomena merely reflect the strength of intermittent reinforcement schedules and the principle of 'spontaneous recovery' (Skinner, 1938), but such arguments are very difficult to sustain. Although rats have been shown to resist extinction schedules containing many hundreds of trials, they are not also punished for being unsuccessful as is the case in gambling. In addition, the notion of spontaneous recovery is not usually applied to behaviours which extend over many years.

A more credible rejoinder might be that people do not gamble in order to win, yet do so because of the thrill and excitement associated with the process of gambling (see Chapter 2). However, this is a point which has not usually been considered in operant studies. Instead, as discussed in the following section, this argument is more usually raised in relation to the application of classical or Pavlovian conditioning to the study of gambling.

4.4 Classical Conditioning and Arousal Theories

4.4.1 Overview

The central assumption underlying these theories was outlined in the previous chapter. In Chapter 3, it was suggested that people's involvement in gambling might be related to certain personality characteristics commonly identified with risk-taking behaviour (viz., sensation-seeking and extraversion). People, it was argued, differ in their need for arousal and excitement. Some people (e.g., high sensation seekers,

extraverts) have low habitual levels of arousal and need additional stimulation in order to reach an optimal level of arousal. Accordingly, through experience risky activities such as gambling come to be seen as a source of this 'desired for' excitement (Anderson and Brown, 1984; Brown, 1986). People become *involved* and persist with gambling not only because of the desire to win money, but also because of the pleasure and excitement associated with the anticipation of winning, making decisions, and facing uncertainties.

The psychological process underlying this relationship is classical conditioning. Aspects of the gambling environment or process (e.g., the uncertainty, certain machines or tables, locations, etc.) become 'secondary stimuli' which become associated with the excitement of winning money. Gamblers will experience increased arousal whenever they are exposed to these stimuli, and it is likely that this process of association will be 'generalised' to other related stimuli. Indeed, as Anderson and Brown (1984) have pointed out, many gamblers will experience an increase in arousal before they even start to gamble. For example, it is likely that merely contemplating the prospect of gambling, seeing a gambling venue, observing an advertisement, or entering a gambling venue will be sufficient to increase arousal levels above baseline levels.

Brown argues that this theory is useful in explaining a wide range of previously unresolved questions in gambling research. For example, the idea that people gamble in order to satisfy a physiological need helps to explain relapses and why people sometimes gamble until all their money is lost. Relapses can be seen as failures on behalf of individuals to obtain stimulation from other sources (e.g., loss of enjoyable hobby, loss of a fulfilling relationship), whereas persistence when losing can be seen as a result of a preoccupation with the excitement of playing rather than the desire to save one's money. The gambler is seen as giving up any attempt to finish ahead because he finds the process of gambling an end in itself. Moreover, the theory also explains why gamblers make foolish and increasingly risky decisions. The high levels of excitement associated with gambling gives rise to disordered thinking and an greater need to increase the size of bets so as to maintain the players' interest in the activity.

On the basis of these principles, Brown (1986) has made several testable predictions. The first of these, noted above, asserts that gamblers should be more likely to have low

habitual levels of arousal and be high sensation seekers. The second is that gamblers should experience large increases in arousal when they commence gambling and that this level should drop steeply once the activity has ceased. A third prediction is that these changes in arousal should be more strongly observed in high-sensation seekers or those with a frequent involvement in gambling. The following section provides a summary of the research which has attempted to verify these predictions.

4.4.2 Research findings related to gambling and arousal

The first of these predictions was investigated by Rule and Fischer (1970) and Rule, Nutler and Fischer (1971) in simple laboratory-based tasks. The aim of this research was to examine whether risk-taking activities would give rise to significant increases in arousal. In both studies, only very small increases in heart rate were observed and it was concluded that gambling did not appear to be a highly arousing activity. However, as Anderson and Brown (1984) and Dickerson (1989) have pointed out, these studies were flawed in that no attempt was made to replicate the results in the context of real-life gambling. In real-life gambling, players can win and lose money, whereas this is not usually the case in laboratory simulations. The fact that no increases in arousal were observed in the laboratory might have reflected the lack of realism and excitement of artificial gambling studies. Thus, in order to investigate this possibility, Anderson and Brown (1984) conducted a two-part study which compared the arousal levels of gamblers playing in an authentic laboratory simulation and a real-life casino. The study compared two groups of players: (1). a sample of experienced casino blackjack players and (2). a group of students with limited experience at playing blackjack. Both groups were given the opportunity to gamble in the laboratory simulation and in the casino. The results showed that both groups experienced increases in arousal in both situations, but that the increase was significantly higher for the regular gamblers in the casino. Anderson and Brown (1984) concluded that their findings cast considerable doubt upon the validity of laboratory studies as a way of investigating the role of arousal in gambling behaviour (see also Dickerson, 1989, Dickerson et al., 1991; 1992).

In recognition of this problem, most researchers have conducted research using gamblers playing in formal gambling venues (casinos, clubs, hotels or arcades), or in

very realistic simulations that closely resemble these venues (e.g., Leary and Dickerson, 1985). Nearly all of these studies have involved poker or fruit machines (the U.K. equivalent) and have shown that gambling does give rise to increases in arousal, but this effect has not been obtained consistently. Results in support of Anderson and Brown's hypothesis have been obtained by Leary and Dickerson (1985) who found that both low and high-frequency poker machines showed significant increases in heart-rate when asked to play a poker-machine under laboratory conditions. This finding has been replicated by Brown (1988) who found that regular fruit machine players' heart-rates increased by over 25 b.p.m. after approximately ten minutes of play; and Griffiths (1993b), who observed a 22 b.p.m. increase in both regular and non-regular players. Griffiths (1993b) also found that the heart rates of regular players decreased significantly upon the cessation of the gambling session, which supported Brown's (1986) prediction that heavier gamblers are more reliant upon the activity as a way of filling a dearth of excitement or arousal. Griffiths (1993b, 1995b) also found, using self-report measures that regular fruit machine players reported feeling more excited during gambling than occasional players.

More recent results have, however, been less convincing. Coulmbe, Ladouceur, Desharnais and Jobin (1992) and Huxley (1993) only found heart-rate increases of five beats or less in occasional and regular fruit/poker machine players. In addition, Dickerson et al. (1992) found little evidence to suggest that arousal is a useful predictor of the duration of a gambling session or sensitive to the general outcomes or dynamics of the game. In their study, the heart-rate of high-frequency players was monitored as they played. No significant differences in mean heart-rates were found between the players who persisted for two hours and those stayed on the machine for less than an hour. Nor did the players' heart-rates change whenever a large win occurred. Thus, Dickerson et al. (1992) concluded that, although gambling appears to generate excitement for many players, this sense of excitement does not appear to be a reliable predictor of persistent gambling. In Dickerson's view, the need for excitement is better seen as an 'external' determinent of gambling behaviour in that it predicts an involvement in gambling, but is less useful in explaining what will happen during a particular gambling session.

Unfortunately, even this more cautious conclusion is subject to challenge. This is because levels of gambling involvement do not appear to be reliably distinguished by differences in arousal (Walker, 1992a). In most of the studies described above, increases in arousal were observed in both occasional and regular gamblers. Thus, increased arousal is not necessarily associated with an increased involvement in gambling. Without further investigation, it is not possible to state whether greater arousal levels are in any way associated with the development of problem gambling. On the other hand, even if it could be consistently established that an increasing involvement with gambling does lead to greater excitement, this would also not advance the argument. People who frequently attend and avidly support a certain football team also experience greater excitement and arousal than those who only have a passing interest in the sport. But this does not imply that these people are developing a 'problem' with football. The increased arousal amongst the regular fans may simply reflect a greater interest in the game. It may have nothing to do with a greater 'need' for stimulation or arousal. The argument, of course, also holds for gambling. For this finding to be useful, one would need to show that increases in arousal are associated with greater problems with gambling (e.g., impulsive decisions, increased expenditure, riskier bets); and, at the present time, this has not been reliably established.

A further problem with arousal research concerns the validity of the measures. In most studies, heart-rate is used. But this measure can be criticised in that it fails to differentiate between the arousal generated psychologically or physically. In poker machine gambling, people have to pull levers, insert coins, and press buttons. Such activity will inevitably leads to increases in heart-rates of itself, irrespective of people's interest in the game. If regular players tend to play more quickly (i.e., press more buttons) as Griffiths (1995a) has indeed found, this may explain why regular players have sometimes been found to show greater heart-rate increases. Although Griffiths and Dickerson have been careful to examine response rate differences between regular and non-regular gamblers, they are still left with the problem of trying to determine what proportion of the heart-rate increase is associated with the physical act of gambling itself.

One way of overcoming this problem may be to examine other measures of arousal, e.g., skin conductance or scalp electrodes, which may be less affected by physical

exertion. Sharpe and Tarrier (1993) suggest that these measures are more sensitive to the arousal experienced during gambling. In their study, a group of problem gamblers was exposed to a series of gambling-related stimuli. Measures of arousal were taken before and after exposure. No significant heart rate increases were found. However, there were large changes in skin conductance and cortical arousal, suggesting that these more specific measures may provide the most effective way in which to test the predictions of Brown, Zuckerman and Anderson's 'arousal theories'. Unfortunately, very little research has been conducted to examine this possibility in studies of *in vivo* gambling behaviour.

4.4.3 Are high Sensation Seekers more likely to experience increased arousal?

A further prediction advanced by Brown (1986) and Zuckerman (1979) was that high sensation-seekers would experience a greater increase in arousal when they gambled. At the present time, there is no evidence available to suggest that this is so. As discussed in Chapter 3, Zuckerman's sensation-seeking scale has proved to be of limited value in predicting gambling involvement. Although there is some evidence to suggest that high sensation seekers are more likely to gamble, the SS scale has proved less useful in predicting the degree of involvement. The paradoxical finding has been that problem and/or heavy gamblers appear to score lower on the SS scale than other members of the population. This is, of course, quite contrary to the predictions of Brown's arousal theory and appears to negate the importance of arousal as a necessary factor in the development of problem gambling.

4.4.4 Anderson and Brown's Application of Reversal Theory

However, what if gamblers only need to be aroused on some occasions? In a second paper, Anderson and Brown (1987) have attempted to broaden their theory by claiming that a desire for arousal is not always a component of every session of gambling activity. Instead, the desire to obtain arousal alternates with other motivations, e.g., the need to satisfy goals (e.g., winning money, playing well, etc.). Their belief in a 'duality' of motivational states is based upon a theoretical idea called 'reversal theory' (Murgatroyd, Rushton, Apter & Ray, 1978), which states that

humans have a natural tendency to vacillate between states of motivation, emotion or perception in much the same way as people's perception of certain geometric shapes, e.g., Necker Cube, Gregory (1975) alters spontaneously between perspectives. On some occasions people gamble because they need excitement (a 'paratelic' or non-goal-orientated state). On other occasions, they gamble because they need to win money, (a 'telic' or non-goal orientated state), and these two states can often change in the course of a single session of gambling. For example, a person might start gambling to obtain excitement (a paratelic state) and later focus upon winning back money which is lost (telic state). Conversely, a person might begin with the intention of winning money and later only play for excitement.

The effects of arousal will vary according to whether a person is in a telic or paratelic state. High arousal in a telic state will manifest itself as anxiety (i.e., people feel that they must win), whereas people will experience excitement when in a paratelic state. Low arousal in a telic state gives rise to relaxation, whereas boredom results if the person is in a paratelic state.

Table 4.1 The Relationship between Arousal and Motivation in Reversal Theory

	Paratelic State	**Telic State**
Low Arousal	Boredom	Relaxation
High Arousal	Excitement	Anxiety

People seek out gambling for different reasons depending upon how they feel. A person who is habitually in a telic state and highly aroused will feel anxious. To reduce this anxiety, the person will gamble so as to change the 'hedonic tone' of the arousal. This is achieved by a change to a paratelic state in which high arousal is experienced as excitement. Another person might be experiencing low arousal and be in a paratelic state (i.e., looking for enjoyment, a 'good time') and use gambling as a way of elevating their arousal so as to feel excited. Changes during the gambling may occur because of winning or losing. Assuming a high level of arousal, if a person loses, they will move from a paratelic to a telic state (e.g., to win back losses) and this provokes anxiety, whereas if the person wins, they will feel excited.

Since problem gamblers are usually more often losing, they are more likely to be telically orientated because of their need to recoup their losses, and this is why they so frequently experience anxiety (e.g., Blaszczynski & McConaghy, 1989). This anxiety itself becomes a reason to gamble because, if the person wins, this becomes a way to switch to achieve enjoyment (i.e., excitement resulting from a switch to a paratelic state). In other words, reversal theory provides a useful way of explaining why a strong desire for arousal is not always consistently observed in problem gamblers. It also provides a useful framework to account for many commonly observed gambling behaviours.

Anderson and Brown (1987) have provided some evidence to support this theory. In a study of blackjack players (Anderson & Brown, 1984) found that people with a high telic orientation as measured by the Telic Dominance Scale (Murgatroyd et al., 1978) experienced a smaller increase in heart rate when they were gambling. This suggested that people who gamble to win money are less likely to experience arousal because this is not their motivation for gambling. However, they found no difference between the telic dominance scores of the gamblers and the norms for the general population.

In the course of this argument, Anderson and Brown (1987) assume that the telic and paratelic states are independent and that one can only experience one state at a time. However, this point which has been vigorously challenged by Walker (1992a), who argues that it is impossible to gamble paratelically, without at least some telic involvement. As Walker points out, all gambling behaviour is goal directed, and this is a point which was emphasised in Chapter 2. Whether a person is playing primarily for excitement or to make a profit, the aim or rationale of the game is still to win money. Furthermore, it is often false to argue gamblers are ever completely telically 'detached' from the activity because, even simple chance activities such as poker machines involve rules and procedures, e.g., choosing the number of lines to play on a poker machine, which numbers to cross off in lotto, what numbers to choose in bingo. Therefore, it does not make sense to say that gamblers are ever completely 'para-telically' motivated. This inability to distinguish the two motivational states clearly means that reversal theory is very difficult to test empirically. How does one know when someone is in one state rather than another? If a person is aroused, does this mean that he or she is anxious or excited? If a person is underaroused, does this imply boredom or

relaxation? The theory makes no clear predictions whether gambling is more likely to be associated with a paratelic or telic orientation.

One possibility, however, is that people may be 'telically' motivated to varying degrees. One person might gamble predominantly to win money, another for excitement. Walker argues that motivation is likely to be related to the type of activity involved. Those activities which allow the player some cognitive involvement in the activity (see Chapter 2) will be more likely to attract players with a telic orientation, whereas chance games with a low level of cognitive involvement will attract paratelically orientated players. Unfortunately, in the only study to investigate this idea (Cocco, Sharpe & Blaszczynski. 1995), the results were found to be inconsistent. Problem poker machine players were found to be more telically orientated and appeared to use gambling as a way of 'switching' to a paratelic state (i.e., pleasure or excitement), whereas racing punters were more paratelically orientated. They gambled to win money (a telic state). Thus, reversal theory does not allow one to predict whether people gamble to obtain a different state or whether gambling is undertaken in the context of an habitual state. As it stands, the theory appears capable of explaining a great deal about gambling, without allowing the possibility for falsification or valid predictions.

4.4.5 Conclusions: gambling and arousal

At the present time, there appears little evidence to support the usefulness of arousal theories in explaining gambling behaviour. Although people find gambling exciting and gamble for this reason, it does not follow that arousal is a necessary factor in determining people's involvement and persistence. Research using such measures as extraversion and sensation-seeking (see Chapter 3) have shown that heavy gamblers have low SS scores and are not pathologically underaroused as the theories of Brown (1986) and Zuckerman (1979) predicted. Most people gamble in order to win money and this is likely to be the major source of their excitement and interest in the game. It is unlikely that excitement will be a significant predictor of gambling involvement, when one controls for the motivation to win money (c.f. Dickerson and Anderson and Brown's warning about the dangers of artificial studies which do not allow the possibility of winning money). Walker (1992a, b) also points out that the predictions of

arousal theory are also not borne out in observational studies of gamblers, which have shown that heavy gamblers show little emotion or excitement when they gamble. These people have a calm, focussed style of gambling and show little reaction when they obtain large wins or incur heavy losses.

For these reasons, Walker (1993) suggests that arousal theories are of limited value in future research. Although other researchers such as Griffiths (1995), Coulombe et al., (1992), Sharpe and Tarrier (1993) remain more optimistic, they also believe that the link between arousal and gambling has still not been reliably established. However, whether this is because of ambiguities in the definition of arousal, a lack of realism of experimental investigations, or the insensitivity of measures, remains unresolved.

4.5 Gambling as an addiction or pathology

4.5.1 Overview

One reason why arousal has received so much attention is because of its role in addiction research which has attempted to classify problem gambling as a pathology, not dissimilar to alcoholism or drug addiction. According to this view, the source of gambling problems is internal to the individual rather than the result of external social or environment forces. Heavy gambling, and more particularly, gambling addiction is a progressive disorder understood in terms of physical imbalances or psychological disturbances. People who gamble excessively do so because of a loss of control over their behaviour resulting from a craving of the stimulation or pleasure associated with gambling, and also because of a desire to avoid the discomfort associated with not gambling.

Historically, this has been the predominant approach in the United States, where most gambling research has been conducted in treatment and addiction centres, and often with the involvement of Gamblers Anonymous (Blume, 1987). As with Alcoholics Anonymous, Gamblers Anon. is based upon the assumption that the treatment of gambling problems must be self-directed. Gamblers must recognise that they have a problem, that they are 'ill' and that recovery will only result from their own actions. This usually involves a complete abstinence from gambling, regular attendance at treatment centres or G.A. meetings, and careful self-monitoring their thoughts and

behaviour. Such techniques, it has been argued, have proved effective in the treatment of alcoholics, and should also work for gambling, assuming that the process of addiction remains the same.

The difficulty in this endeavour, however, has been to clarify whether excessive gambling can be seen as an addiction. As will be shown: although the majority of addiction studies share common assumptions, researchers have differed in their views concerning the processes underlying the addiction. Whereas some have tried to classify problem gambling as a form of physiological dependence similar to drug and alcohol addiction (Orford, 1984), many others have classed the behaviour as a type of 'psychological addiction' (Davison & Neale, 1974; Walker, 1989). The difference between these two approaches and the evidence available to support them is described separately in the sections that follow.

4.5.2 Gambling as a form of physiological dependence

Traditional approaches to the study of addictions have suggested that physical dependency results from two central processes: tolerance and withdrawal. Tolerance refers to the fact that people have to ingest an increasing amount of a substance to obtain the desired effect, whereas withdrawal refers to the negative or unpleasant sensations experienced when the effect of the substance dissipates (Jellinek, 1952; Orford, 1984). It has been suggested that these effects occur as a result of interference to the body's natural production of opiates, viz., endorphins, the chemicals responsible for maintaining positive feelings or mood states. According to this view, a substitution effect occurs, whereby the ingestion of drugs leads to a decrease in the production of natural endorphins and an increasing reliance upon external sources for these substances (Peele, 1985). The lower the production of natural endorphins, the greater the need for drugs containing these substances (tolerance) and the greater the likelihood of negative psychological and physiological symptoms resulting from a decrease in 'dosage'. Alternatively, as suggested by Solomon and Corbit (1974), the process of tolerance and withdrawal may result from relative imbalance of two 'opponent processes' relating to the effects of the substance: first, an A-process, which involves the development of a positive affective state resulting from the immediate ingestion of the substance; second, a B-process which involves the development of

negative affective states once the effects of the A-process have disappeared (withdrawal). Solomon and Corbit argue that the repeated use of a substance leads to a gradual decrease in the strength of the A-process and a corresponding increase in the strength of the B-process. People need to take an increasing amount of the substance to elevate the A-process to the same level. At the same time, however, the person is faced with an increasing need to avoid the unpleasant effects of the B-process. Accordingly, when the person reaches the stage of using a substance simply to avoid process B, the person is said to be addicted.

In gambling research, it has been argued that the excitement and pleasure of placing bets and winning represent the 'physical substances' of gambling addiction (Boyd, 1982). Gambling gives rise to physical changes in the body: increases in arousal, feelings of euphoria as a result of increased endorphin production. Consistent with the theories of Peele (1985) and Solomon and Corbit (1974), it is suggested that gamblers increase the amount they bet in order to maintain the desired level of positive affect, but experience tension, anxiety and depression when they are not gambling (Dickerson, 1989; Griffiths, 1995; McGurrin, 1992; Walker, 1989; 1991; 1992a). Indeed, these notions have formed a central component of the official DSM classifications for pathological gambling (American Psychiatric Association, 1980, 1987, 1991) which has included such items as:

(a). A need to increase the size or frequency of bets to achieve the desired excitement (DSM-III-R and DSM-IV).

(b). Restlessness or irritability if unable to gamble (DSM-III-R and DSM-IV).

(c). Gamble as a way of escaping from problems or intolerable feeling states (DSM-IV).

As Walker (1992a) has noted, each of these concepts has been investigated in relation to gambling, but the results have not been very promising. For example, in an investigation of the hypothesis that regular gamblers should experience greater positive affect when they gamble, Blaszczynski, Wilson and McConaghy (1986) compared the β-endorphin levels in high-frequency horse-racing punters and poker machine players with those in a sample of non-gamblers. Although the results for the horse-racing gamblers were consistent with predictions, no significant difference was observed between the control group and the regular poker machine players. Moreover, for both

groups, there was no significant difference in endorphin levels obtained before and after gambling.

Other researchers have attempted to find evidence to support Opponent Process Theory in terms of distinctive changes in heart rate. Specifically, it was suggested that heavy gamblers should experience smaller change in heart rate when they commence gambling and a sudden drop in this rate when they cease gambling because of the diminished effect of the A-process (Walker, 1989). However, as discussed in Section 4.4., this prediction is inconsistent with the predictions of arousal theory, which suggest that regular gamblers should experience larger increases in arousal. Moreover, this suggestion is not confirmed by existing empirical research which has found either, no change in heart-rate, or larger increases in regular players (e.g., Anderson & Brown, 1984; Dickerson et al., 1991, 1992; Griffiths, 1993b; Leary & Dickerson, 1985). Indeed, of those studies which have examined heart-rate changes upon the cessation of gambling, only Griffiths (1993b) has found evidence that the heart-rates of regular gamblers would decrease more rapidly once gambling had ceased. However, even in this case, the level did not fall below the baseline level obtained before gambling commenced.

Further studies have examined whether withdrawal symptoms are a common feature of heavy or excessive gambling. Wray and Dickerson (1981), for example, surveyed a sample of problem gamblers receiving treatment and found that approximately 30% reported depression and anxiety as a result of giving up gambling. However, as Walker (1989) observed, there was little evidence to suggest the existence of the strong physical reactions commonly observed in people recovering from other addictions.

Why is it difficult to see gambling as a form of physiological dependence? The answer, according to Walker (1989; 1992a), is that gambling is not nearly as pleasurable or as arousing as many drugs. Drugs such as heroin and cocaine give rise to measurable changes in brain function through their effect upon neurotransmitters, endorphin production, and so forth. By contrast, there is little evidence to suggest that gambling gives rise to similar effects. The fact that the behaviour of gambling might sometimes resemble that of drug addicts, e.g., increasing bets to maintain interest in the game, and depression when not gambling, does not imply the existence of similar biological processes. Walker argues that it is wrong to confuse a need for interest and

excitement with a pathological need for stimulation or pleasure. People can feel excited by an activity without experiencing any substantial increase in arousal. Thus, it has been suggested that a more fruitful approach to 'gambling addiction' might be to classify problem gambling as a psychological addiction, which does not necessarily involve the ingestion of a physical substance or change in biological processes.

4.5.3 Gambling as a psychological addiction

The term 'psychological addiction', as defined by Davison and Neale (1974) extends the definition of addiction to include an excessive involvement in, or use of, substances or activities, which have deleterious effects upon a person's well-being (Griffiths, 1995a). Unlike physiological addictions which result from attempts to avoid withdrawal symptoms (Solomon & Corbit, 1974), psychological addictions develop as a result of people's attempt to obtain positive reinforcement. This positive reinforcement can involve excitement, in the case of pathological risk-taking, pleasure, e.g., hypersexuality, or a need to satisfy drives, e.g., excessive food or drink consumption. People engage in these activities because the behaviour satisfies a need (McCormick, 1987). For some, this is the need to escape worries and anxiety, whereas for others it may be a way to escape depression and loneliness (Jacobs, 1986, 1988; Taber, McCormick, & Ramirez, 1987). Through a process of gradual conditioning, people find gambling is the only way to relieve negative feeling states, and so they develop an increasing reliance upon the activity. The anticipation of gambling brings a sense of tension, and an opportunity for release, whereas an inability to gamble will lead to a sense of frustration, increased anxiety and depression.

At it stands, this definition is better in that the pursuit of a particular activity for pleasure is not sufficient to class that behaviour as an addiction (Walker, 1989). As Walker (1989) notes, many people engage in behaviours which are repetitive and pleasurable, yet which have no significant effect upon normal functioning. Accordingly, it is important that an additional criterion be applied to the behaviour or habit, namely that it must have a harmful effect upon the individual involved, or else upon society or others in contact with the individual. If this requirement is not included, it is likely that just about any regular behaviour could be considered an addiction (Marlatt, Baer, Donovan & Kivlahan, 1988; Walker, 1989). Walker argues that the most appropriate

definition is that provided by Jacobs (1986), which specifies the following criteria, which are also endorsed by Brown (1988).

(a). A desire or need to continue the activity which places it outside voluntary control.
(b). a tendency to increase the behaviour over time.
(c). psychological dependence upon the positive effects of the activity.
(d). a detrimental effect upon the individual or society.

This definition is probably the best so far in that it provides a generally accurate description of the characteristics of problem gambling. However, as Walker (1989) points out, this description does not explain why the problem occurs. For example: What need is satisfied by gambling? Why do gamblers increase their behaviour over time? Although these questions have been investigated by a number of authors, one is again left with a considerable body of theoretical argument, but without any convincing empirical research to substantiate any of the claims.

For example, in one the most well articulated accounts, Jacobs (1986, 1988) argues that people participate for one of two reasons, namely, for excitement, or for relaxation and as a way of reducing anxiety. The former, he terms 'hyper-aroused' gamblers, the latter he terms 'hypo-aroused'. According to this view, people gamble in order to obtain an 'altered sense of reality' that allows them to transcend all the limitations of their everyday existence. People, whose lives are lacking purpose or identity obtain meaning and a sense of accomplishment from gambling, and become 'hyperaware' of their skills and, at the same time, less cogniscant of their failures and limitations. As Walker (1992a) observes, this theory again provides a satisfactory description of many aspects of gambling behaviour. However, it is unclear how this altered state develops. The fact that Jacob's uses the terms 'hyper and hypo' aroused suggests that arousal might play a central role in his explanation, but if this is so, his argument cannot be strongly endorsed because the lack of evidence to support the role of arousal in gambling. The fact that many gamblers do not appear to experience increased arousal from gambling; the lack of clear associations between sensation-seeking or extraversion and excessive gambling (Chapter 3), and the fact that many problem gamblers are more likely to gamble to win money rather than for the

excitement, suggests that Jacob's ideas are probably only applicable to a small subset of gamblers.

The second argument proposed by what might be termed 'need-state models' is that people gamble to escape unpleasant feeling states such as depression and anxiety. According to Walker (1989), this argument is more plausible. A considerable number of studies, (e.g., Bergler, 1957; Blaszczynski & McConaghy, 1989; Blaszczynski et al., 1990; Dickerson et al., 1991; 1992; Greenson, 1947; McCormick, Russo, Ramirez & Taber, 1984; Moran, 1970a, b) have revealed that negative mood states are commonly observed in problem gamblers and high-frequency gamblers. It is quite logical to assume that people will gamble to obtain pleasure (e.g., increased endorphin levels) and remove these feelings. Unfortunately, this argument suffers the same problem as that observed in studies of the personality characteristics of problem gamblers. The studies are retrospective rather than prospective meaning that one cannot be certain that the characteristics or symptoms observed in problem gamblers are the cause or result of the gambling. In the case of depression, it is equally plausible to argue that heavy losses at gambling cause people to feel depressed, rather than making them want to gamble to start with. Again, the only way in which to overcome this problem is to undertake a longitudinal study which examines the people's mood states before they started gambling excessively.

4.5.4 Gambling as a problem of impulse control

The final element said to be characteristic of an addictive disorder is that the destructive behaviour should be largely uncontrollable. This view was central to the development of the first psychiatric definition of gambling in the DSM-III (1980), which classified pathological gambling as a form of impulse-disorder, not dissimilar to compulsive stealing (kleptomania) and hair-pulling (trichotillimania). As with people with recognised impulse disorders, it was argued gamblers experience physical and psychological tension prior to the commencement of gambling, and experience a strong sense of pleasure or release once they are actively involved in the activity (McGurrin, 1992). By 'impulsive', it is meant that gamblers find it very difficult to resist the urge to gamble and feel that they have to undertake the behaviour without delay.

Implicit in this definition is the assumption that the gambling is unplanned or involuntary. However, as Vatz and Weinberg (1986) have noted, there are many difficulties associated with making this diagnosis because of the inability of therapists to measure volition or free-will, i.e., to show that any behaviour is truly involuntary. In other words, how does a psychologist ever know that a person has no control over his or her actions? Self-report measures or accounts of so-called 'out-of-control' behaviours are usually obtained retrospectively, with patients informing the therapist that they 'lost control', 'did not know what they were doing', or 'were unable to stop'. However, these statements do not prove that the person had no voluntary control over the behaviour. Instead, such statements may be no more than ad hoc explanations or justifications for undesirable behaviour. People appeal to such terms when they are unable to find any other meaningful explanation. In the same way in which people find it difficult to describe their true motivations for gambling (see Chapter 2), people may also not understand why they find it difficult to stop gambling.

In one of the few empirical investigations of this topic, Allcock and Grace (1988) administered Barratt's Impulsivity Scale to a sample of problem gamblers in treatment in NSW, Australia. The results showed no significant differences between the scores obtained by problem gamblers and a number of comparison groups consisting of a non-clinical control group, a group of alcoholics and a sample of drug addicts in a treatment programme. Consistent with the previous observations of Orford (1987), Allcock and Grace argued that these results confirmed their own clinical observations, namely, that there was little symptomatic evidence to suggest that gambling is an impulse disorder. These observations have revealed that that most problem gamblers neither experience pleasure of gratification when they gamble, and do not gamble merely upon impulse. Instead, the decision to gamble is usually a premeditated and rational process. In most cases, gamblers only gamble because this behaviour serves as a means to an ends, for example, to pay off debts or to provide financial rewards. Thus, as Allcock and Grace point out, gambling is better seen as a 'maladaptive behaviour' rather than a form of mental disorder. Problem gambling is not a permanent quality of the individual, but usually a reflection of poor habits which need to be identified and monitored. Quite often this is a process which problem gamblers are able to undertake themselves, without clinical interventions.

This lack of similarity between problem gambling and traditional impulse disorders has led researchers to consider other explanations for impaired control in gambling. One of the more promising of these has concerned the similarities between problem gambling and the symptoms typically observed in children with Attention Deficit Disorder (ADD) (Goldstein, Manowitz, Nora, Swartzburg, Carlton, 1985). ADD is characterised by a limited attention span, impulsive behaviour, an inability to delay gratification and insensitivity to punishment. Carlton and Manowitz et al. (1988) administered a modified ADD scale to a sample of 16 problem gamblers and found that they scored significantly higher on ADD items than a control group. This suggested the possibility that ADD during childhood may be antecedent to the development of gambling problems in adulthood.

Recent psychobiological evidence suggests that such traits can be directly linked to deficiencies in the production of certain neurotransmitters thought to be associated with impulse control. One of these substances is serotonin (5-hydroxtryptamine: 5HT) which has an inhibitory effect upon the cortex and is associated with more controlled behaviour (McGurrin, 1992). It has been found that decreased 5-HT levels are associated with heavy alcohol consumption (Branchey, Shaw & Leiber, 1981), whereas higher levels increase the likely effectiveness of alcoholic treatment programmes (Naranjo, Sellers, & Lawrin, 1986). McGurrin (1992) and Griffiths (1995) have argued that this substance may also play a role in the development of problem gambling. The question which remains, however, is how researchers will ascertain the direction of causality, namely, whether decreased 5-HT levels are the result, or cause, of problematic levels of gambling.

4.5.5 The Notion of Impaired Control

More recently, the notion of 'impulse disorder' has been eschewed in preference for the more general term' impaired control'.[2] This notion has been most strongly advocated by Baron, Dickerson, and Blaszczynski (1995), and Dickerson (1993) and refers to the inability of regular gamblers to: (a). resist the urge to gamble, (b). cease gambling once the behaviour has commenced. Dickerson's approach has been classified by Orford (1987) as a 'social learning approach' because it regards problem

[2] See also Browne (1989) for a discussion of 'going on tilt'.

gambling as a progressive disorder. According to this view, problems develop not because of the existence of some underlying genetic disposition, addiction or personality difference, but because of the complex interaction between the individual and the environment. Based upon recent developments in alcohol research (Dickerson, 1987; Marlatt, 1979) which have questioned the validity of traditional addiction models (see Section 4.5.2), it has been argued that infrequent, regular and problem gambling are all points on the same continuum. Rather than seeing these groups as being qualitatively different, Dickerson et al, have looked for quantitative differences (e.g., in the amount spent on gambling, strength of the urge to gamble, or ability to stop gambling when desired). On this view, classifications such as 'regular' and 'problem' gambler are not seen as fixed, because people can frequently move back and forth between these two states. In other words, problem gamblers may often, without assistance, regain control over their gambling and maintain a regular, affordable habit, whereas regular gamblers may develop gambling problems. Thus, as Dickerson and Hinchy (1986) have noted, gambling should not be seen as an irreversible addiction. Problem gamblers and regular gamblers are likely to share more similarities than differences, so that studies of the latter are likely to yield a lot of valuable information about the former, and vice versa.

But why do gamblers lose control over their gambling? As Baron, Dickerson and Blaszczynski (1995) have noted, this point is often avoided by some researchers, who have assumed that 'impaired control' simply means what it suggests, viz., a loss of control. However, this does little to advance the argument. For the term to be useful, one must be able to identify the circumstances under which 'impaired control' is most likely to arise. The first stage in this process is to examine the population of gamblers most likely to be at risk. Dickerson (1987), and Dickerson et al. (1995) believe that the risk of impaired control is related to the frequency of gambling, the level of gambling experience and the type of gambling involved. People most at risk of developing impaired control are likely to be regular gamblers with considerable gambling experience and whose preferred gambling activities are continuous (see Table 2.1 or Figure 2.1). Accordingly, the highest incidence of gambling problems are likely to occur in relation to casino games, gaming machines and horse-racing because of the ease with which people can make repeated gambles.

As discussed earlier in this chapter, Dickerson's preferred explanation for this loss of control is largely behavioural; gamblers lose control over their gambling because their behaviour becomes increasingly dictated by factors beyond their control. Through repeated gambling, people's behaviour become 'locked into' patterns of reinforcement provided by gambling, that any stimulus associated with gambling (e.g., the sight of a gambling venue, etc.) is likely to engender an irresistable urge to gamble. Similarly, once a person has commenced gambling, he or she cannot stop gambling because of the strong desire to obtain the next win.

Impaired control is a useful concept because of its emphasis upon the progressive or learned nature of gambling problems. However, the term is also subject to the same criticisms as early attempts to classify gambling as an impulse disorder, namely, that one is entitled to know the source or cause of the irresistible impulse or loss of control. Inevitably, one is left back where one started, having to choose an appropriate psychological theory which can explain how this loss of control occurs. The fact that Dickerson has chosen to explain impaired control in predominantly behavioural terms is merely a matter of personal choice, and does not rule out the possibility that other researchers will approach the topic from a different theoretical perspective. Until an effective explanation can be provided to account for the presence of 'impaired control', the notion remains little more than a useful research tool for describing the behaviour typically associated with problem gambling (Dickerson, McMillen, Hallebone, Volberg, & Woolley, 1997).

4.5.6 Summary of Section 4.5

This section has provided an overview of various attempts to understand gambling behaviour in terms of traditional models of addiction or pathology. To a large extent, these attempts have failed to advance our understanding of etiology or characteristics of gambling behaviour. Despite attempts to classify pathological or problem gambling as an impulse disorder, research has shown that this is unlikely to be appropriate. Excessive gambling does not appear to be involuntary as with most other impulse disorders. Instead, research has shown that problem gambling behaviour (e.g., chasing, relapses) is usually premeditated, and that many problem gamblers are able to regain control over their gambling without therapeutic intervention. This has been confirmed

in studies by Allcock and Grace (1988), who have found, using standardised impulsivity measures, that gamblers are no more impulsive in their everyday lives than people who do not gamble. Although Dickerson's work on 'impaired control' has partially reduced this problem by claiming that 'impaired control' is a progressive disorder rather than an underlying pathology, there are still difficulties in identifying the factors underlying the phenomenon of impaired control.

Similar difficulties have been faced by those who have attempted to identify problem gambling as a form of physiological addiction. Studies of gamblers in treatment have shown that gamblers are not sensation seekers and are not habitually underaroused. Gambling does not give rise to excessive levels of arousal or feelings of pleasure as drugs, and many problem gamblers tend to express little emotion when they gamble. In addition, there is little evidence to support the idea that gamblers experience withdrawal symptoms when they cease gambling.

Finally, attempts to establish links between gambling and a need to escape unpleasant feeling states such as depression and anxiety have proved promising, but inconclusive. Although researchers generally agree that excessive gambling is associated with these symptoms (e.g., McCormick, 1987; McCormick, Taber, Kruedelbach, Russo, 1987), there has been no attempt to show whether these states precede the gambling, or whether they are merely symptomatic of the feeling of despair resulting from the experience of heavy losses.

4.6 'Rational' Approaches to the study of gambling

4.6.1 Overview

Until now, it has been assumed that gambling behaviour is driven by factors largely beyond the control of the gambler. In the case of behaviourist theories, for example, behaviour was seen as maintained by schedules of reinforcement, whereas arousal and addiction theorists have seen gambling as a way of fulfilling a physical or psychological needs. In the analysis which follows, however, these approaches are relinquished in favour of a second class of theories which regard gambling as a rational, or cognitively driven behaviour. According to Walker (1992a), Lesieur (1979; 1984; 1992), Lesieur and Custer (1984) gambling is primarily based upon the need to win money. Arousal,

excitement, gamesmanship, etc., are all merely byproducts of this underlying motivation, and would not exist without it. Accordingly, other explanations are not regarded as inconsistent with 'rational' explanations, but less important. Justification for this approach has arisen from survey findings that many gamblers, particularly those who are involved in skilled games, rate 'winning money' as an important motivation for their gambling (Caldwell, 1974; Dickerson et al., 1991; Dumont & Ladouceur, 1990; Fabian, 1995; Griffiths, 1993b; Walker, 1992a). This change also reflects the observation that most gamblers do not appear to be helpless victims of external factors beyond their control. On the contrary, gambling is seen as a premeditated and voluntary activity, in which the existence of 'impaired control' does not necessarily imply the existence of an underlying pathology (Allcock & Grace, 1988).

Instead, problems are thought to be the result of unrealistic optimism regarding the possibility of winning money from gambling. Although most gamblers may often be privately aware of the difficulties associated with winning money from gambling and the nature of the odds (See Chapter 2), they are unable to give up the hope that they will eventually win. In other words, their problems may arise from the fact that they spend too much time and money trying to obtain this anticipated reward. Accordingly, the question of interest is to understand the beliefs or motivations which underlie this desperate, and fruitless, pursuit of winning. The sections which follow provide a detailed account of sociological and cognitive research which has examined this question in relation to samples of problem and non-problem gamblers.

4.6.2 The importance of chasing in gambling

A central component of all established definition of problem gambling is the notion of 'chasing' (DSM-III, 1980; DSM-III-R, 1987; DSM, IV, 1991; Lesieur,1974; 1979; Lesieur & Blume, 1987; O'Conner, Dickerson, & Blaszczynski, 1995). 'Chasing' refers to the practice of trying to recover gambling losses by further gambling. According to Lesieur (1984), chasing can be both short-term and long-term in nature. Short-term chasing usually arises when gamblers visit a gambling venue with the intention of winning a sum of money to meet a short-term financial commitment (e.g., insurance, an unpaid bill), whereas long-term chasing occurs when people begin to

chase losses over successive days and weeks. Short-term chasing usually occurs under two circumstances: firstly, when people fail to achieve the gains that were expected during the single gambling session, or secondly, when they spend more than they had budgeted. In this situation, chasing typically involves an increased likelihood of the gambler: increasing bets following losing outcomes, increasing bets towards the end of a session, or betting on outcomes with longer odds.

In most cases, short-term chasing will be observed in regular gamblers (Dickerson et al., 1987; Rosecrance, 1986), and is only rarely associated with the development of gambling problems. However, when this behaviour is extended over many weeks or months, 'long-term' chasing is said to have begun. In Lesieur's view, this is one of the most obvious indications that a person has developed a gambling problem. Gamblers who need to chase their losses are typically no longer able to meet the costs of everyday living and are using gambling to pay off debts and costs incurred by previous gambling. This has been confirmed by Lesieur (1984) in a series of detailed case studies, in which it has been found that long-term chasing develops in a number of distinct stages. Gamblers begin by being unable to meet the costs of short-term commitments and have to borrow money from friends or cash in securities or sell property to raise enough money to continue gambling. Once this source has been exhausted, they are forced to borrow money from their wives, immediate relatives and business associates. This process continues until the person is so short of money and desperate that they contemplate or commit crimes to raise the money, or else approach high-interest money lenders ('loan sharks'). In other words, there is a gradual increase in the person's involvement in gambling, combined with a decrease in the number of 'options' available to meet the expense of the activity.

Thus, according to this view, problem gambling is seen as arising from economic pressures rather than from any underlying addiction or impulse disorder. Although such behaviour might seem foolish or irrational from an outsider's perspective, from the gambler's viewpoint, gambling is clearly a rational activity with a rational goal, namely, to win money. Consistent with the arguments presented in Chapter 2, Lesieur believes that those who hope to win money, but who are aware that this is unlikely, are less likely to develop gambling problems. However, this is unlikely to be so for those who *expect* to win money, and who see gambling as a potential way of making a profit.

Such people are inevitably bound for disappointment and frustration, and it is these feelings which may be associated with the onset of chasing.

But why do people believe that they can win money by gambling? This question is examined in the following sections which consider the cognitive and emotional factors which underlie the process of chasing. Commencing with a discussion of the notion of 'entrapment', these sections will then examine the role of heuristics, biased cognitions and irrational thinking in the maintenance of persistent gambling behaviour.

4.6.3 The Role of Entrapment

According to Walker (1992a) and O'Conner et al.(1995), chasing may represent a real-life illustration of a process termed 'entrapment', a concept which has been investigated by Rubin and Brockner (1975), Brockner, Shaw and Rubin (1975), Brockner and Rubin (1985), Shubik (1971), Teger (1979). The term 'entrapment' refers to conflict situations in which people continue to persist with unproductive activities so as to justify the considerable resources already expended. Entrapping situations are very common and include such everyday situations as a reluctance to: buy a new item after having spent a considerable amount repairing existing items, leave a bus-stop after waiting a long time, or sell a failed business after spend many years building it up. Specifically, 'entrapment situations' can be defined as those where: (a). People pursue goals in which the costs or 'investments' in the activity are irretrievable, (b). The 'decision-maker' has a meaningful choice of entering or avoiding the potentially entrapping situation, and (c). The probability of obtaining the goal is less than one.

When people enter entrapping situations, they do so mainly to obtain the desired goal, but as additional resources are invested, this motivation becomes blurred. As Brockner et al., (1975) point out:

> *During the latter stages of the conflict, the decision-maker's motivation for continued investment may include the need to justify previous expenditures, the desire to win no matter what the costs, and the wish to appear strong before any salient audience. Each of these motives may be maladaptive and could cause prolonged investments. (p. 494).*

Although Brockner et al.'s work did not specifically relate to gambling per se, Walker believes that their studies of entrapment provide a useful illustration of how similar

processes might occur in real-life gambling. For example, this notion may help to explain why blackjack and racing gamblers continue to use gambling systems which have repeatedly proved to be unsuccessful; and why lottery and bingo gamblers become 'entrapped' because of their belief in lucky numbers.

In Brockner et al.'s experiments, students were given $5 and told that they could keep this money or take part in a short electronic game that would allow them to win an additional $3. The game involved an electronic counter which could be advanced to 500. Subjects were told that a mystery jackpot number between 0 and 500 had been randomly selected. They were told that they could set the counter going and pay one-cent for every number advanced in the hope of 'reaching' the winning number. They could stop whenever they wanted. Subjects were aware that if the number was more than 300, they would lose money, e.g., if the winning number was 350, they would get $3 extra for the jackpot, but have to pay $3.50 for 350 advances of the counter. On the other hand, if they participated and withdrew after less than this (i.e., without winning), they would also lose money, i.e., their participation fee of $5 plus (1-cent) x (number of numbers advanced). Only if the winning number was less than 300 would subjects make a profit from participating.

This situation contained all the elements common to entrapment situations. Subjects had a choice whether to participate; there was an uncertain goal and investments in the activity were irretrievable. The longer a person stayed in the game, the greater would be the cost of involvement and, theoretically, the need to continue to regain or justify what had been expended. Brockner et al.(1975) found that the majority of subjects chose to play the game, with 12% of subjects persisting until they had lost all their money, including their participation fee. Only 14% of subjects chose not to play, and the remaining percentage (74%) persisting for an average of 150 trials. In this way, the study effectively demonstrated that how even a small prize or 'jackpot' is sufficient to create entrapment. Many subjects were clearly unable to stop the counter once they had reached a certain point. Presumably, this was because their need to cover their losses became as important as their initial desire to win.

Rubin and Brockner (1975) and Teger (1979) have suggested that the effect is largely a function of situational factors: the effect of uncertainty of outcomes, the irretrievable nature of losses; or the fact that people have to continue to justify their

time, money and effort. However, the psychological determinants of the behaviour remain largely unknown. Although a number of possible explanations can be advanced, e.g., pride, stubbornness, greed, a need to win, a 'need to know' the winning number, or a dislike of being beaten, there is no theoretical reason to favour one over any of the others. Indeed, the effect could be the result of a combination of such factors. Consequently, until the psychological processes underlying the processes underlying 'entrapment' have been more clearly identified, the term remains largely descriptive; in most cases, little more than a synonym for excessive and maladaptive persistence.

4.7 Cognitive Biases and Heuristics in Gambling Behaviour

4.7.1 Introduction: the traditional approach

As discussed in Chapter 2 (Section 2.7), early cognitive accounts of gambling behaviour (e.g., Von Neumann & Morgernstern, 1947), were based upon the assumption that gamblers were rational decision-makers. Consistent with principles of traditional 'economic' theory, the aim of gambling was to maximise the benefit or 'utility' of the activity while also minimising the associated risk. Thus, it was argued that, for each gambling activity and gambling decision, it was possible to determine the most rational choice. Each gambling decision was associated with a certain level of utility, and each outcome had a certain probability of occurring. Consequently, it was thought possible to determine the most desired decision by multiplying this probability of winning by the 'utility' of the gamble. Gamblers, it was argued would choose to gamble on those activities or options which offered the greater product of these two qualities (i.e., the 'highest expected value'). Most research has shown, however, that this is rarely the case (e.g., Arkes, Joynes, & Pezzo, 1994; Cohen, 1972; Edwards, 1953; Winefield, 1962).

On the contrary, as outlined in Section 2.7, gamblers tend to favour some probabilities, or combinations of probability and utility, in preference to others (Walker, 1992a), and often believe that the probability of success is higher than the objective odds would suggest. Thus, it has been suggested that, while people gamble for rational reasons (e.g., to win money), the way in which people gamble may not be rational, or based upon expected values. Instead, as Kahneman, Slovic and Tversky

(1982) and Wagenaar (1988) have found, people's judgements are usually irrational. When people gamble, they do not process all the information which is available or study the probabilities of winning with the same scrutiny as a mathematician (but see Ceci & Liker, 1986 for an exception). This is because most people are very inefficient, or biased processors of information. They have a limited memory, ability to concentrate, and find it difficult to make complex decisions under pressure. As a result, their decision-making tends to be based upon 'short-cut' methods termed heuristics, which are simplified 'ways of explaining' or interpreting complex events. Although these short-cuts are often useful to reduce the complexity and confusion of everyday life, an unfortunate consequence of these biases is that they tend to give rise to false perceptions about the nature of gambling. These include an overestimation of the extent to which gambling outcomes can be predicted or influenced, and a misleading view of how much has been won or lose in the past.

A full list of the most common of these biases has been provided by Wagenaar (1988) and Griffiths (1990b, 1994, 1995a). However, as will be presently discussed, only a small number of these have been subject to systematic research. Thus, the sections which follow are confined to a list of five biases which are considered the most important in maintaining gambling behaviour, and which are most relevant to the empirical research conducted as part of this project. These biases are as follows:

(a). The representativeness heuristic or the 'gambler's fallacy'.

(b). The availability heuristic

(c). The simulation heuristic/ hindsight bias

(d). Biased or flexible attributions.

(e). The illusion of control.

4.7.2 The 'Representativeness' Bias or 'Gambler's Fallacy'

The 'gambler's fallacy' or 'representativeness bias' (Kahneman & Tversky, 1972; Kahneman, Slovic & Tversky, 1982) is perhaps the most widely documented of all the biases listed above, and has been the subject of laboratory research since the early 1950s (e.g., Jarvik, 1951). The gambler's fallacy refers to people's tendency to perceive dependence or relationships between events which are, in reality,

independently or randomly determined. This bias arises because people believe that short-term distributions of events should reflect long-run expected sequences. Thus, if the probability of two events A and B are respectively P(A) and P(B), people believe that the frequency of occurrence of these two events for a given sample of X events, should approximate: P(A) x X and P(B) x X. For example, in the game of roulette the probability of obtaining red or black is equal to 18/37 (assuming one zero). Accordingly, if the wheel was spun 100 times, it would be predicted, according to the 'law of averages', that approximately 18/37 x 100= 50% of the outcomes would be black and 50% would be red. However, because each event is independent, it is also equally probable that a completely different distribution could occur, such as, for example, 70 reds and only 30 blacks.

However, as Kahneman and Tversky (1972) point out: although the likelihood of both patterns is identical in objective terms, people do not treat them as similar. People are much more likely to see the alternative with an equal frequency of reds and blacks as being more likely. This is because this pattern is more 'representative' of the long-run or expected distribution of outcomes. Deviations from the expected distributions are seen as aberrations, and will be 'corrected' by subsequent events. This is because the maintenance of aberrant results is seen as violating the 'law of averages' and is inconsistent with the assumption of randomness. In randomly determined series of events, it is assumed that each outcome has a consistent probability of occurrence. If too many events of one type occur in a row, this appears to violate this assumption. Accordingly, people believe that if one type of event has occurred disproportionately often, this increases the likelihood of the occurrence of the other event, i.e., to maintain the expected distribution of events. Thus, people come to believe that the probability of occurrence of one event is related or dependent upon the sequence of events which preceded it, i.e., the gambler's fallacy.

In gambling activities, this bias can be related not only to the nature of events, but also the result or outcome (i.e., win or loss). People apply this type of thinking to events, e.g., coin-tosses, numbers in roulette or lotto, and also to the frequency of wins and losses. 'Two-up' players who have observed too many heads in a row will change their bets to tails; roulette and lotto players will bet on those numbers which have not appeared for a long time. But, more generally, gamblers will believe that a certain

periodicity applies to the pattern of wins and losses. Wins will be expected to occur at certain intervals, so that if the gambler has not won for a long time, this increases his or her expectation that a win is due. Thus, as Corney and Cummings (1985), Rachlin (1990) and Johnson and Bruce (1993) and Garling, Romanus and Selart (1994) have pointed out, a long sequence of losing outcomes is not seen as a disincentive for gambling, but as an 'investment' in an increased probability of winning Thus, the gambler's fallacy offers a useful way of explaining persistent gambling behaviour.

But what evidence is available to support the existence of this heuristic? According to Cohen (1972), this evidence has emerged from two sources: firstly, experiments on randomness, and secondly, studies of 'negative recency'.

Findings from the first area of research have been reviewed by Tune (1964), Wagenaar (1972), Rappoport and Budescu (1992) who have concluded that people have a very poor understanding of random events. For example, when asked to produce a random sequence of events (e.g., letters or numbers), or else identify a sequence which 'looks random', people consistently choose sequences which contain too many alternations, or which avoid any sort of consistency or pattern. In sequences based upon heads or tails, for example, people believe that sequences such as HTHTTHTHTTTHH are more random that HHTTHHTTHH because the former contains no consistent pattern. Similarly, a sequence such as HTHTHTHTHT will preferred to HHHHHTTTTT because it seems unlikely that one would obtain so many similar outcomes in succession. Objectively, all sequences are, of course, equally probable, but because people believe that short-term sequences should display the same degree of 'apparent randomness' as long-term sequences, they try to choose sequences with an equal proportion of heads and tails, and in which the two events are frequently alternated.

The term 'negative recency' was first used by Jarvik (1951) and has been the topic of considerable research in the 1950s and 1960s (e.g., Edwards, 1955; Goodnow, 1955; Winefield, 1962; 1966). Negative recency occurs when people show a tendency to alternate their responses following the occurrence of a long sequence of an identical event, e.g., a change to Event B, following successive occurrences of Event A. This tendency is usually assessed in terms of conditional probabilities. People who have an increased probability of predicting Event A following the occurrence of Event B, or

vice versa, are said to display negative recency, whereas those who tend to predict the same event are said to display 'positive recency'.

Winefield (1962) and Cohen (1972) have argued, a belief in the gambler's fallacy almost inevitably leads to negative recency. The longer one has observed a sequence of identical events (i.e., which appear to violate the 'law of averages'), the greater will be the tendency to predict the alternate outcome. However, as they also emphasise, it does not always follow that the occurrence of negative recency means that the person believes in the gambler's fallacy (i.e., that the events are related or dependent). In some situations, people alternate their responses, because the alternate response is thought to be more likely (e.g., in studies where P(A) is not equal to P(B)). As Cohen has observed:

> *...even mathematicians who are perfectly convinced of the independence of the outcomes of successive tosses of a coin are still inclined to predict a particular outcome just because it has not occurred for a relatively long time in a series of tosses." (1960, p. 123)*

Cohen 's research also led him to the conclusion that negative recency was more likely to be observed in relation to betting behaviour than outcomes (i.e., wins vs. losses). That is, people were found to vary their predictions of events based upon previous outcomes, whereas variations in stakes (i.e., increases or decreases of bets) did not appear to be influenced by whether they won or lost on previous trials. In this regard, his findings were consistent with research by Leopard (1978) who has revealed individual differences in responses to winning and losing wagers. Some gamblers consistently increase their wagers following loses, others consistently decrease their wagers, whereas a third group shows an equal likelihood of increasing or decreasing their bets after they have won.

The conditions under which negative recency occurs have also been investigated by Winefield (1962, 1966), who used a two-choice card guessing task. In this study, people were asked to draw playing from a deck of cards and guess each time whether they thought the card would be red or black. In one condition, subjects were informed as to the relative proportion of both types of card, in another condition they were not. The study also used sampling with and without replacement. Assuming that subjects would behave rationally, Winefield argued that negative recency would be most likely to occur when sampling occurred without replacement and where subjects were aware

of the relative proportion of each type of card. The rationale for this was that if the proportion of red cards was, for example, No. red cards/ total cards (n/T), the drawing of a black card without replacement would increase the relative proportion of red cards, i.e., n / T-1. Thus, it would seem to rational to select red whenever black cards had been drawn (i.e., negative recency). Unfortunately, this was only partially confirmed. Although the 'informed group' / with replacement displayed negative recency in relation to the more frequently occurring card, they were no more likely to do so than those who had no information and who were drawing cards with replacement. Therefore, Winefield (1966) concluded that, while negative recency is a common facet of two-choice situations, the strength of this effect does not appear to be influenced by subjects' knowledge about how the task is structured.

However, as he also points out, this might also be due to several methodological limitations of the study, which may have reduced the strength of the effects which emerged. For example, it was possible that the measure of negative recency may not have been sufficiently sensitive. In comparing the relative percentage of guesses which involved a change of guess after having obtained a run of the alternate outcome, only runs of 1,2 or 3 alternate outcomes were considered; but no attempt was made to examine whether red was more likely in longer series of blacks or reds (Winefield, 1962, 1966), e.g., whether red was more likely to be picked after 5-10,.., n blacks in a row? This is an important point because of the likelihood that strong beliefs about the relatively likelihood of black and red, may have been related to long sequences rather than short-ones. Many subjects may have needed 50-75 trials of the possible 200 before they felt confident about the remaining proportion of reds or blacks. Negative recency might not be displayed until players were confident that a relatively large percentage of one type of card had been removed from the pack. ([1]) Furthermore, this problem might have been compounded because players in all 4 conditions may not have fully utilised previous information when making their decisions. If subjects found it difficult to keep track of the cards, it is likely that there was little consistency in their responding, and this would further reduce the likelihood of a clear negative recency effect being observed.

---

[1] This point is confirmed by the behaviour of professional blackjack players (e.g., Davis, 1995), whose card-counting strategies are applied in situations similar to the one created experimentally by Winefield (i.e.,.information + no replacement) Players increase their bets when the relative proportion of value-10 cards increases. However, this only occurs after many trials (50 or more) have been observed.

Similar methodological problems have been observed in attempts to study the 'gambler's fallacy' in studies of real-life gambling. Dickerson et al. (1991; 1992), for example, asked poker machine players to rate on a scale (0-100) how confident they were that the machine was going to pay-out during ongoing sessions. These ratings were obtained every five minutes or after the subject had obtained a large win. Dickerson et al. found no relationship between expectancy ratings and the play-rates or number of wins obtained in the minute preceding the rating, and concluded that cognitive factors appeared to play little role in gambling behaviour. However, as Walker (1992a) observed, the fact that many of the subjects in Dickerson's study played for an hour or less meant that he could not have obtained any more than 12-15 ratings for each subject, and this was clearly inadequate for any sort of meaningful analysis. Players may have varied their expectancies much more frequently than every five minutes, and this would not have been discerned by the measure that was used.

An additional issue raised by Phares (1956) is that the likelihood of negative recency may vary according to the type of gambling. According to Phares, negative recency is more commonly observed in chance-determined tasks where gamblers have no control over the outcomes (c.f. Poker machines), but less commonly in skilled tasks where control is possible. Specifically, when players are asked to rate their expectancy of success on skilled tasks, subjects tend to increase their expectancies following wins (positive recency) and decrease their expectancies after failures (negative recency). This is because, in skilled tasks, a win confirms the efficacy of the player's actions, whereas a failure draws attention to the person's inability. By contrast, when people are gambling on chance tasks, the reverse tendency tends to be observed, with subjects typically increasing their expectancies following failures and decreasing them after successes. Phares explains this phenomenon in the following way:

> *In a chance situation, Ss may be expected often to invoke the 'gambler's fallacy,' basing their expectancy upon fallacious reasoning such as, 'Well, I've been right three times in a row, so it's about time I was wrong.' The result is a decrement in expectancy following success; a decrement based not so much upon the previous trial as upon a fallacious view of the odds for success and failure. (1956, p. 339)*

Clearly, based upon Phare's work, the gambler's fallacy would most likely to be observed on continuous activities classified as requiring low skill (Table 2.1). Such

activities include slot machines, roulette, two-up and dice games. Unfortunately, as Griffiths (1994) has pointed out, very little research has been conducted to examine these predictions in relation to real-life gambling. Consequently, one important aim of this research project was to undertake a detailed examination the use of gambler's fallacy logic in slot machine gambling in South Australia. Details of this research is described in Chapters 9, 10 and 11.

4.7.3 The Availability Heuristic

The second common bias commonly observed in gambling is the 'availability-bias' (Corney and Cummings, 1985; Holtgraves & Skeel, 1992). This term, developed by Tversky & Kahneman (1973), refers to people's tendency to make decisions based upon 'memorable instances' rather than knowledge or logic. This bias is thought to be a symptom of inefficiencies in human information processing resulting from limited recall, concentration and people's reluctance to expend too much cognitive effort when making judgements. A consequence of this bias is that if a particular piece of information is more readily remembered, it will also be more likely to form the basis of decisions in the future. However, the information which is used might not always be the most useful, or representative facet of a person's previous experience. In fact, as Tversky and Kahneman (1973) have found, people show a tendency to recall only those events which are more recent, salient or personally relevant to them.

In gambling, logic typically applies to winning outcomes. Gamblers are much more likely to recall their wins than their losses, because wins are more important and salient part of their gambling experience. When people win, they are positively reinforced: card players evoke the admiration or envy of their peers; poker machine players experience a range of visual and auditory stimuli (Griffiths, 1993c), whereas two-up and craps players will sometimes be congratulated by entire audiences if they are successful in throwing the outcomes on which they have bet. In other words, rather than soberly comparing their wins to the relatively large numbers of losses incurred, people may tend to judge their success according to the absolute number of wins obtained, or focus upon the small number of large wins which readily come to mind. Consequently, gamblers remain more optimistic about their prospective chances of success than an objective assessment of their previous performances would suggest.

As Corney and Cummings (1985) note, there is presently no research available to show when this heuristic is used by gamblers. However, the work of Oldman (1974) suggests that an availability bias is more likely to be used at the onset of a session of gambling than during the session. In Oldman' study, it was found that regular roulette players would move from table to table when they began a session. If they obtained immediate wins on a particular table, they would identify the table as a winning table and would expect further successes to follow. On the other hand, if they obtained no wins at any table, they would very likely leave the casino and conclude that this particular occasion was not 'their lucky night'. In this sense, behaviour arising from a belief in the availability heuristic is quite the opposite to that arising from a belief in the 'gambler's fallacy', which would predict greater confidence in winning following the occurrence of a long series of losses.

Therefore, it would be reasonable to predict that use of an 'availability heuristic' would lead to be development of 'positive recency' (see Section 4.7.3). If people have been winning on a particular outcome (e.g., win or loss, head or tail), they would expect similar outcomes to follow. However, as with the 'gambler's fallacy', there may be difficulties associated with using positive recency as a way of inferring the use of an availability heuristic. This is because of ambiguity concerning the cause of positive recency. The fact that a person repeats the same gamble does not necessarily imply that he or she believes that outcome to be more 'available'. Instead, it could relate to beliefs concerning personal luck (e.g., red is my lucky colour), or the use of skill or strategies (e.g., a belief that one can determine when the croupier is going to spin red based upon his technique, or the angle with which the ball enters the wheel, etc.). For this reason, investigations of the 'availability bias' must be undertaken with some caution. Expectancy or response changes must be analysed in the context of the gambler's general beliefs concerning the cause of the outcomes.

4.7.4 The Simulation Heuristic/ Hindsight Bias

According to Griffiths (1995a), gamblers frequently experience frustration when they fail to obtain the results which they desire. Long periods of losses, near-misses, jackpots on nearly machines, or small unsatisfactory wins leave the gambler feeling dissatisfied. In situations such as this, the gambler is left with two choices: either he

can continue gambling in the hope of eventually winning, or he can stop gambling altogether. In players choose the first option, there is a chance that they will lose even more money. But, on the other hand, if they stop, they will be left with the lingering thought that if they had played a bit longer, they might have won. Thus, the decision to continue gambling may, in part, be linked to the gambler's desire to avoid the feeling of regret that arises from abandoning the activity.

These ideas are central to a third common heuristic identified by Kahnement et al. (1982): the 'simulation heuristic'. The simulation heuristic refers to the use of counterfactual or 'what if' thinking in relation to uncertain events. It occurs whenever people try to imagine how things might have turned out if certain events or actions had, or had not, occurred. These counterfactuals can be upward (e.g., If I had done X, I would have won a lot more) or they can be downward (e.g., I was lucky that I didn't do X). They can also refer to acts of omission (e.g., If only I had done X) which arise when people believe they have missed out on opportunities, or they can refer to acts of commission (e.g., I should never have done X), where a person might feel regret for having performed an action with undesirable consequences (Gilovich & Wells, 1989; Gilovich & Husted Medvec, 1994; Kahneman & Miller, 1986; McMullen, Markman, Gavanski, 1995; Roese, 1994).

People, it has been found, find it very easy to make upward counterfactuals, that is, to imagine how things could have turned out for the better. This is particularly so in situations where the 'alternate' is readily imaginable. For example, as Kahneman and Tversky (1982) point out: if two men are running late for a flight and one arrives 5 minutes late, this man will experience significantly more frustration than the other who arrives 30 minutes late. Although both situations are identical in objective terms (i.e., both missed the flight), they are not psychologically equivalent. This is because the man who arrived only five minutes late can more easily imagine how things 'might have been' if he had arrived slightly earlier. It is only a small logical step to see how this might also apply to the experience of 'near-misses' discussed earlier in this chapter (Johnson, 1986). Those who go very close to obtaining the outcomes they desire, can more easily 'mentally simulate' what might have happened if the final winning symbols had been in the right position, and so have a greater desire to continue gambling.

Indeed, Walker (1992a) believes that this notion of regret may offer a valid explanation for the phenomenon of entrapment discussed in Section 4.6. In his view, people persist with gambling because they grow accustomed to the ritual and routine which it entails. The person who purchases a bingo or lottery ticket week by week, or follows a favourite horse, grows accustomed to this process. He or she cannot feel content unless this routine is maintained. If forced to go elsewhere for a time, people have been observed to request others to gamble on their behalf: to place bets at the track, to buy them a lottery ticket. In Walker view, this occurs because people cannot bear the thought of missing out. To fail to buy a ticket and risk missing out on a win would be regarded as a waste of all the time and effort already devoted to the activity.[2]

In this connection, Walker's point is based upon the assumption that a strong feeling of regret arises from an act of *omission*. However, as discussed by Taylor et al. (1991) and Miller, Turnbill, and McFarland (1995), it has generally been found that the experience of regret is more intense following the occurrence of 'acts of commission'. That is, people are more likely to experience a feeling of regret for having acted wrongly rather than for failing to act, or to take advantage of a situation. This is because people can more easily imagine themselves having not performed the behaviour which led to the undesirable outcome (i.e., as according to the simulation heuristic). Indeed, this has been confirmed in studies by Langer (1975), Knetch and Sinden (1984), and more recently by Bar-Hillel and Neter (1996), who have shown how people's tendency to persist with simple gambling activities (e.g., bingo, lotteries) can be explained using this logic.

In a typical experiment, a group of students enters a room and is issued with a lottery ticket. Each student notes the number of his or her ticket and then the experimenter explains the nature of the gamble. Students are told that they can give up their ticket for a small monetary prize or keep their ticket in the hope that they will win the single large prize, e.g., $50. In most of these experiments, students are extremely reluctant to give up their tickets, with Langer's study showing that this reluctance

---

[2] Recent advertising campaigns used by the Australian Lottery Commission have utilised this theme as a central component of their promotions. A recent advertisement, for example, featured the line 'How would you feel if your favourite numbers came up, and you missed out on 2 million dollars'. The unfortunate gambler is depicted wandering around his home facing the contempt of his family members, including the family dog, which upon seeing his disgraced master, promptly turns on its heels and runs away!

increases the longer a person has held possession of the ticket. Presumably, this is because the longer a person holds a ticket, the more they will come to contemplate the possibility of winning, meaning that they would feel a greater sense of regret should their ticket happen to be a winner.

It is not difficult to see how these principles can be extended to other types of gambling. The roulette, bingo or lottery gambler who changes the number(s) and then observes them come up; the poker machine player who changes machines and sees the next person obtain a jackpot; these people all share the same dilemma faced by the students in the ticket experiments. Do they persist with the activity or risk making a decision they might regret? Since either decision can result in a negative result, it is sometimes difficult to conceptualise where the dilemma arises. Is it that people experience regret from the fear of missing out, which would be the case if they decided not to continue (Walker's point above); or is it that they fear that they will regret the consequences of their actions (i.e., the decision to stop)? The former is an act of omission, the latter is an act of commission. It is likely that the answer will depend upon whether people know the outcome of the action they did or did not perform. The person who leaves the casino and does not look to see what happened on the machine afterwards would not experience the same regret as a person who witnessed the next person get a jackpot. Bar-Hillel and Neter illustrated this point in a lottery ticket experiment using two conditions: one where subjects would be aware if they missed out after exchanging their tickets, another where they would not know. As predicted, people in the 'awareness' or 'regret' condition were less likely to exchange their tickets than those who did not know the outcome.

As a result, it is possible to make several predictions concerning the role of simulation heuristics/ counterfactuals in gambling. Firstly, regret is more likely to occur when: (a). People are aware of the outcomes of their actions or inactions, e.g., that their forsaken ticket or machine was a winner, (b). When an opportunity is lost as a result of some action on behalf of the gambler, e.g., leaving a particular machine, not gambling using their favourite numbers, decreasing one's bet just before the winning symbols or number appear, (c). When the person was very close to obtaining the outcome that was desired, e.g, as occurs when gamblers obtain a near-miss.

Once again, almost no research has been conducted to investigate these ideas in real-life gambling behaviour. This is possibly the result of difficulties in measuring the experience of regret (c.f. Bar-Hillel & Neter, 1996). In Bar-Hillel and Neter's study, the role of regret was studied by asking subjects to indicate whether their reluctance to exchange tickets was based upon their fear of regret; few subjects indicated that this was the case. These measures were obtained retrospectively (i.e., after the ticket drawing had taken place), so it is uncertain whether this measure provides an accurate assessment of the cognitive processes that influenced the decision (Nisbett & Wilson, 1977). A second problem is that the study was only a laboratory simulation of real-life gambling. Based upon Anderson and Brown's (1984) finding that gamblers experience less arousal in simulated studies, it is possible that laboratory studies of regret and disappointment are also unable to offer a valid assessment of people's emotional responses to unsuccessful gambling outcomes.

4.7.5 Biased Attributions in Gambling: the work of Gilovich

An established principle in cognitive psychology is that people interpret the occurrence of good and bad events in a biased manner. Good or successful events are attributed to internal or personal factors such as ability of skill, whereas bad outcomes are attributed to external, or uncontrollable factors (e.g., luck or bad circumstances). This attributional style is commonly referred to as the 'self-serving bias' (Miller & Ross, 1977; White, 1959) and is generally regarded as a healthy way of maintaining self-esteem (Abramson, Seligman & Teasdale, 1978). People who interpret events in this way are generally less likely to experience depression (Peterson & Seligman, 1973) and tend to be more optimistic (Seligman, Abramson, Semmel, & von Baeyer, 1979).

However, as Gilovich (1983), Gilovich and Douglas (1986) have pointed out: while this optimistic attributional style may be healthy in most areas of everyday life, it may not be so healthy when applied to situations involving risk. In gambling, for example, it has been established that it is very difficult for players to make a profit, and that there is little opportunity for skilful play. Yet, if gamblers apply self-serving biases and attribute their wins to personal skill and their losses to external factors (e.g., bad luck), they may not lose their faith in being able to win. Instead, they remain confident

UNIVERSITY OF ADELAIDE LIBRARY

that they are 'good gamblers', and so they continue to gamble oblivious to the fact that they are losing considerably more than they are winning.

Gilovich has conducted several studies which illustrate the use of this bias in gambling activities. In the first of these studies (Gilovich, 1983), a group of college students was selected and asked to place bets upon the outcome of a number of football or basket-ball games scheduled for the following week-end. Once the games were over, the students were brought back into the laboratory to receive their 'winnings' (usually a percentage of the initial stake) and asked to provide a detailed analysis of each game: why each team won, the decisive points in each game, and so on. Finally, some weeks later, the same students were contacted by telephone and asked to recall as much information about the matches as they could. Based upon Wong and Weiner's (1981) finding that people engage in more attributional activity to 'explain away' failures, Gilovich hypothesised that students would 'create' significantly more explanations to 'explain away' the losses than they would to justify the winning results. They would also be able to recall more information about the losing matches several weeks later. Both these predictions were confirmed.

To extend this finding, Gilovich conducted a second study which examined the effect of varying people's perceptions of how the sporting match had been decided. Once again, a group of college students was approached and asked whether they had bet on a particular basket-ball game held the week before. If they said yes, they were asked to participate in the study. Each student was presented with a match report of the game and, having read it, asked to rate their confidence that their team would win the following week. Half of the subjects was given a standard match report (control condition). The other half was told that the outcome had been decided by a very lucky or 'fluke' outcome (fluke condition/experimental condition). Gilovich predicted that, because of the effect of biased attributions, the knowledge of the fluke would be treated differently by those who had lost or won on the match. Those who had won would ignore the 'fluke' and be just as confident about their team's performance as those in the control condition. They would attribute the 'fluke' to their team's ability. By contrast, those in the lose/ fluke condition, would treat that fluke as a way of explaining away the loss. The loss would lead them to treating the game as a 'near

win' and so their confidence in their team's ability would be higher than those who had lost, yet who had been unaware of the fluke. Again, both hypotheses were supported.

One limitation of this study was that subjects were not asked to rate whether they believed the win or loss to be the result of skill or luck. Thus, a third study was conducted. This confirmed that people in the win/fluke condition tended to attribute the win to skill rather than good luck, whereas those in the loss/fluke condition attributed the loss to bad luck.

Therefore, this series of studies was effective in showing that biased attributions could be observed even in student gamblers playing for very small prizes. The question, however, was whether these findings could be extended to other types of gambling. As Gilovich and Douglas (1986) have pointed out: sports-betting is naturally amenable to this type of biased interpretation because of the complexity of the activity. People can find numerous valid reasons to explain why one team won while another did not. Consequently, Gilovich and Douglas (1986) designed a second study which involved a game where the outcomes were entirely determined by chance. This game was called 'bing'.

In each game of 'bing', two subjects would be seated on either side of a table. In front of them would be 12 squares and a series of levers. At the start of the game, subjects had to choose twelve numbers (1-24, excluding 11 and 22, for reasons explained later). Once both players had chosen the numbers, the game would begin. Subjects would take turns to push the levers. The levers would activate a random number generator which produced numbers between 1 and 24. If the number generated matched one that the player had chosen, one of his twelve squares was filled in. If an 11 or 22 came up two squares of the subjects choice would be filled. The winner was the player who first filled all his squares. In all cases, this would be the player on the right because the outcome of the game was predetermined. For half of the players who won, the result occurred following a moderate lead held throughout the game. However, for the other half, it occurred as a result of a fluke series of events. The play would be 5-6 points behind his opponent and then obtain two doubles, two single numbers in the space of only five turns and win the game by a single point. As result, half of the opponents would lose as a result of a fluke, whereas the other half would not.

The aim of the experiment was to examine how these differences in the determination of the outcome would influence subsequent gambling behaviour. If asked to play a second game of 'bing' would losers and winner in the fluke/no fluke condition differ in the amount they were willing to bet? As Gilovich and Douglas (1986) found, the results for this study were similar to those reported in Gilovich (1983). Subjects in the loss/fluke condition bet significantly more than those in loss/no fluke condition, whereas no difference was observed for the winning subjects. Again, this suggested that winning by way of a 'fluke' was treated as equivalent to winning by a larger margin. However, as Gilovich and Douglas also point out, a problem with this finding was that it remained unclear whether the pattern of bets necessarily reflected a biased attributional process. In this case, a biased process was implied rather than demonstrated, and it was possible that there were other factors which might have explained the effect. For example, subjects in the fluke condition were willing to bet more in the second game because they had obtained greater excitement/enjoyment from the first game. Thus, their tendency to take greater risks might have been unrelated to their beliefs about their superior playing ability and biased evaluations of their performance.

To address this problem, Gilovich and Douglas conducted a second study which varied the amount of control which players could exert over the outcome (control vs. no-control). Their hypothesis was that the pattern of result observed in the first experiment would only emerge when players believed they could influence the outcomes (e.g., by being able to choose their own numbers, pull the levers, etc.). This hypothesis was confirmed. Thus, the authors concluded that biased attributions of performance can influence gambling behaviour even when the outcomes of the activity are ostensibly chance-determined.

4.7.6 Attributional Processes in Real-life Gambling

A limitation of Gilovich's work is that his findings have yet to be confirmed in realistic gambling settings using people who gamble regularly, or using other types of gambling (e.g., card games) where skill is possible. Consequently, the work of Atlas and Peterson (1990) is of interest because it is one of the few studies which has attempted to apply attribution theory to real-life gambling. Atlas and Peterson's work

differs from that of Gilovich in that persistent gambling is not seen as a result of excessive optimism. Instead, they hypothesised that excessive gambling would be more likely to be associated with a pessimistic attributional style. They based this prediction upon the work of Peterson (1988), and Peterson and Seligman (1987) who have found that pessimistic people are more likely to display depressive symptoms, impaired judgement, and excessive rumination (Kuhl, 1981; Vestre, 1984) following unfavourable outcomes or events. Such tendencies, they argued, would make pessimistic people more vulnerable to the negative consequences of gambling. These people would be less able to accept losing and would suffer feelings of helplessness. In this state, they would be less likely to maintain control over their gambling.

Atlas and Peterson investigated these ideas using a sample of 53 regular punters at a suburban harness-racing venue. Punters were administered Peterson et al's (1982) Attributional Style Questionnaire (ASQ) at the start of the races. This short scale asked them to rate how they typically 'explained' good or bad events. People who tended to make internal, stable and global attributions for bad events, and the reverse for good events, were classified as having a more pessimistic explanatory style. In addition, punters were asked to keep a short diary of the day's racing. This included details of how much they bet on each race, whether they lost or won, their thoughts about the outcome of each race. The hypothesis was that a pessimistic attributional style would be associated with greater rumination following losses, poor decision-making (i.e., a loss in the next race) and increased risk-taking on the next race.

The results only provided partial support to these predictions. Although pessimistic attributional style was positively related to the amount of rumination and that was, in turn, related to larger bets on subsequent races, the other hypotheses were not supported. For example, pessimistic style was unrelated to the amount wagered on each race or their expressed confidence of winning. Thus, this study confirmed the findings of learned-helplessness, attribution and mood research, which suggests that depressed or pessimistic people are less likely to expressive confidence in their ability to succeed in tasks with uncertain and/or uncontrollable outcomes (Alloy & Abramson, 1979; Alloy & Abramson, 1981; Alloy, Abramson & Viscusi, 1981; Dickerson & Adcock, 1987; Dykstra & Dollinger, 1990; Golin, Terrell & Johnson, 1977; Kuiper, 1978; Ladouceur & Mayrand, 1987; Rizley, 1978), and are more likely to ruminate

over negative events. The results are also generally consistent with those of Gilovich described above, which suggested that gamblers spend a considerable amount of time explaining away, or justifying their losses. Rumination is a way of explaining away events which might affect one's sense of self-worth, and this appears to be a characteristic of both pessimistic and optimistic people.

In other words, the fact that Atlas and Peterson have found a higher incidence of rumination in pessimistic people than in optimistic people does not imply that they ruminate for different reasons. Instead, it may be that pessimistic people have lower self-esteem and have a greater need for explaining away their misfortunes. Consequently, the question whether gamblers are likely to be optimists or pessimists (from an attributional perspective) is difficult to resolve. Although intuitively, it would seem reasonable to associate gambling with excessive optimism, it is also possible that gamblers become more pessimistic as their involvement in gambling increases. Repeated losses teach the gambler that success is very difficult to obtain, and this pessimism is then generalised to other areas of the gambler's life.

4.8 The Illusion of Control

4.8.1 Overview

In Chapter 2, it was noted that gambling activities can be differentiated in terms of the amount of skill which each contains. It was argued that, in certain activities (e.g., card games and racing), gamblers can influence the expected value of the activity by careful decision-making and the use of certain optimal strategies. In blackjack, for example, it is possible to reduce the house's edge by playing 'basic strategy' and counting the cards as they emerge from the deck (Davis, 1993; Keren & Wagenaar, 1985; Walker, 1992a; Walker et al., 1995). In racing, one can improve one's chances through careful study of the odds, a horse's racing history, starting gate, track conditions and length of the race (Solonsch, 1991a). In a similar vein, it was argued that skilful play is not possible in the vast majority of other activities, e.g., coin-throwing games, roulette or poker machines, which were classed as unskilled or offering little 'cognitive involvement'. However, it was also acknowledged that this objective classification system might not always accord with that of gamblers, many of

whom may perceive a subjective probability of success which is greater than that implied by the objective odds.

This inability to distinguish skilled and chance situations is central to 'illusion of control' research. According to this view, persistent gambling can be explained by the fact that gamblers overestimate the extent to which they influence gambling outcomes. In skilful games, gamblers believe that they are expert players, whereas in chance games, gamblers perceive the possibility for skilful play even when this is not possible. Langer (1975), Frank and Smith (1989), Breen and Frank (1993), and Bouts and van Avermet (1992) believe that this problem arises because many of the characteristics which are typically associated with skilled games (e.g., decision-making, physical involvement, competition, etc.) are also found in chance gambling activities. Thus, it was hypothesised that situations which bore the closest resemblance to skilled activities would give rise to a greater illusion of control.

4.8.2 Experimental Investigations of the Illusion of Control

In order to investigate these idea, Langer (1975) conducted a series of ingenious experiments involving simple games of chance. In each of these, there were two conditions. In one condition, an element of 'apparent skill' was introduced to the game; in the other, there was no such element. Langer's aim was to see whether the introduction of elements usually associated with skilful activities would influence people's perceptions of the activity, in particular, their belief that they could influence the outcomes. The manipulated variables included: the extent of perceived competition, the degree of physical involvement, the possibility of choice, the ability to practice, the time between the commencement of the game and the determination of the outcome. Langer found that manipulating these variables had a significant effect upon behaviour. A brief summary of these results is provided below.

(a). *Competition*: people who played a card guessing game against a shabbily dressed opponent placed significantly larger bets than those who played against a confident, well-dressed opponent.

(b). *Involvement*: people who participated in a coin tossing task and were allowed to make their own tosses bet significantly more than those who bet on the

tosses made by the experimenter. In addition. it was believed that practice could improve their performance, and that the task would be more difficult if there were distractions.

(c). *Choice*: people who chose their own tickets from a barrel valued their tickets a lot more than those given a ticket by the experimenter.

(d). *Familiarity*: people who were allowed to practice a random line-guessing game before the experiment displayed greater confidence in their performance than those who had not practised.

Langer argued whether a person develops an illusion of control will be strongly related to their initial perceptions of the task. People who obtain few successes when they commence gambling will perceive that the task is uncontrollable and will not develop an illusion of control. By contrast, those who experience immediate success will be more likely to believe that they are skilful. Langer and Roth (1975) investigated this hypothesis using a coin-tossing task in which the sequence of wins and losses was varied. This experiment had two conditions: one in which subjects experienced a large number of wins at the start of the game, and another, in which the wins came later. As predicted, those who experienced the early wins were more confident about their ability to improve their performance in a second session. They were also more likely to indicate that their performance could be influenced by practice.

From these findings, Langer concluded that illusory beliefs were likely to be a common feature in all types of gambling activity. However, as recent research by Ladouceur and his associates has shown, this prediction has not always been realised. For example, Ladouceur and Mayrand (1984) were unable to replicate Langer and Roth's (1975) coin tossing study. Similarly, Ladouceur, Mayrand, Dussault, Letarte, and Tremblay (1984) found that increased participation and involvement had little influence upon subjective perceptions of control or confidence about future performances in a dice-throwing task. As a result, Ladouceur et al. concluded that the illusion of control did not appear to be a strong or reliable effect, although they admitted that this inconsistency may have been partially related to the nature of the methodology used in their experiment. Specifically, whereas Langer and Roth had

disguised the nature of the task by introducing it as a study of social cues, Ladouceur and Mayrand told subjects that the task was about coin tossing. Thus, subjects in Ladouceur and Mayrand's experiment may have guessed what the study was about, and behaved rationally because this was the socially desirable response.

For these reasons, Ladouceur et al. turned their attention to more realistic gambling activities which were more likely induce an illusion of control. In the first of these studies, the Ladouceur, Tourigny and Mayrand (1986) examined whether increasing familiarity with roulette, would lead to greater perceptions of control and greater risk-taking. Subjects were asked to play roulette in three successive sessions with a short interval in between. As predicted, subjects made larger bets and rated themselves as more skilful in the third session.

4.8.3 A Critique of Illusion of Control Research

However, apart from difficulties in successfully replicating results, a further problem with illusion of control research is that it is not always clear whether the effects observed truly demonstrate a genuine overestimation of control. In most cases, this is because the illusion is inferred rather than demonstrated. For example, in Langer's experiment which involved the drawing of lottery tickets, it was found that people valued their own tickets more highly than those given to them by the experimenter. While this result is consistent with an illusion of control explanation, there is no evidence to prove that this was so. Indeed, one could just as easily account for this behaviour in terms of simulation heuristics or entrapment. People prefer to keep their tickets; firstly, because of their fear of giving away something which eventually turns out to be of value (Bar-Hillel & Neter, 1996); and secondly, because this is a way of justifying all the time and effort already spent anticipating the drawing of their winning number.

A more subtle problem plagues the findings of the coin and dice-throwing experiments. In these studies, it is assumed that both activities are uncontrollable, so that any perceptions of skilful play are automatically classified as illusory. However, what researchers have failed to recognise is that many subjects may have had legitimate reasons for believing that control was possible. This is because in most gambling venues (whether legal or illegal, in casinos or student colleges), both games are treated

as if some influence was possible. Two-up and craps games, for example, are strictly monitored, with rules to distinguish between what are classed as 'fair' and 'unfair' throws. Presumably, 'a fair throw' means that each outcome is equally probable (e.g., heads vs. tails), whereas an 'unfair' throw means that the player has thrown in such a way so as to make certain outcomes more or less likely. By implication, such rules imply that both games *can* be influenced by the player, e.g., dice can be rolled down the palm, so that they roll end over end thereby reducing the probability of the 'end' number occurring [NB. See also Oldman (1974) who has raised similar points in relation to the game of roulette].

For these reasons, Langer and Roth's findings are less surprising. Many people (even students) may believe that some skill is possible in these activities and that practice and concentration can influence a person's performance. Thus, it is unclear whether this experiment provided a true test of illusion of control theory. Although the findings are still consistent with the general notion that people overestimate their ability to control outcomes, they do not necessarily support the suggestion that people treat uncontrollable activities as if they were controllable.

This criticism does not, of course, extent to all of Langer's experiments. In some cases, unfamiliar tasks were used, so that the illusion of control effect could not be attributed to previous knowledge or experience. For example, in one experiment subjects were presented with a perspex sheet covered with several metal strips. Subjects were given a stylus and told to place it upon the strip which they believed to be 'active' (i.e., electrified). If they guessed correctly, a buzzer would sound. In all cases, the 'active' strip was randomly determined. As Langer found, those subjects who were allowed to make the selections themselves *and* who were familiar with the task bet significantly more, and were more confident of success, than those who bet on outcomes determined by the experimenter. Given that the task offered no possibility for control or skilful play, the results supported the idea that people perceive skill in tasks which are entirely chance-determined.

However, the problem with this study was that the measure of perceived skill was subject to socially desirable responding. In asking subjects to rate how their performance would rate against an expert chess player (Langer, 1975, p. 319), it would be socially desirable or logical for those with no familiarity or involvement with

the task to say that they would not perform very well. Furthermore, even if one assumes that this result does reflect a genuine misperception of the task, one cannot assume that players believed that the task was potentially controllable. Instead, as Walker (1988) and Griffiths (1994) have found in studies of slot machine gambling, people will rate their chances of winning as being higher on certain machines because these machines are familiar and lucky. In other words, as Walker (1992a) notes, the notion of illusion of control, or overestimation of the probability of success, does not always imply skill or control. Instead, it is better seen as having two components. In addition to Langer's definition which emphasises the role of false perceptions of skill and control, there is also the belief that certain personal qualities (e.g., personal luck) can increase the likelihood of success.

These issues have been comprehensively discussed by Rothbaum, Weisz and Snyder (1982) who have distinguished between types of illusory control termed 'primary' and 'secondary' control (see also Letarte, Ladouceur, & Mayrand, 1986). Primary control refers to the belief that the person can directly influence the outcome (i.e., Langer's definition), whereas secondary control refers to a belief in external factors (e.g., luck, God or fate) can influence the game. In their view, most of Langer's findings are likely to be related to secondary control. People felt more confident when physically involved in guessing tasks because they believed themselves to be personally lucky. Thus, it is quite possible for people to attribute outcomes to personal qualities without believing that they have any direct influence over the outcomes. As Wagenaar and Keren (1988) have recently pointed out:

> *The distinction between chance and luck can explain why people are trapped by the illusion of control, even when it is clear that they have no influence on the physical causation determining the outcomes of events. [For example] They cannot change the outcome of the roulette wheel, but they can employ their luck, which helps to place their bets on the winning number (p.65)*

In this context, luck and skill may be linked. Skilful players are those who know when their 'luck is in' or 'out'. Such players know when to continue gambling and when to stop (Wagenaar and Keren, 1988). In this connection, these findings are not necessarily inconsistent with Langer's original theory. Whether skill or luck is involved, the result is the same, namely, that people believe that they can exert some personal influence over chance-determined events. For these reasons, it is important

that researchers recognise that personal influence is not always synonymous with the notion of skill. It is suggested that future studies which attempt to measure the illusion of control based upon observations of behaviour (e.g., variations in bet sizes, confidence ratings), should be supplemented by reliable and valid self-report measures to ascertain the true nature of the cognitive factors which underlie the behaviour observed.

4.8.4 Insights from Learned-helplessness Research

Although commonly discussed in relation to gambling behaviour, the illusion of control has also been of interest in other areas of psychology. One of the most significant of these has learned helplessness research (Seligman, 1995), which examines how human subjects respond to uncontrollable tasks. Although primarily concerned with the effects of negative reinforcement and punishment upon behaviour, this area of research has increasingly examined the effects of non-contingent positive reinforcement upon people's behaviour. This work is of interest because many of the experimental effects observed bear considerable resemblance to those obtained by Langer (1975), but are interpreted differently, usually from a behavioural or operant perspective.

For example, in a series of laboratory experiments, Alloy and Abramson (1979) designed a task in which subjects had to press one of two buttons to switch on a particular coloured light. A series of trials was given and, independent of the subjects' behaviour, fifty percent of the trials were reinforced, i.e., the subjects was informed that they had the correct answer. Despite the uncontrollable nature of the outcomes, a substantial percentage of subjects indicated that they had caused the outcomes, with many describing the strategies that they had used. This effect has since been confirmed by Alloy, Abramson and Viscusi (1981), and Matuse (1995) in similar experiments.

The fact that these findings have been obtained using tasks with which subjects had no prior experience, and that the effect emerged irrespective of the amount of subject involvement, adds further support to Langer's (1975) theory. Humans appear to have a tendency to respond to non-contingent patterns of outcomes as if they were controllable. However, the question which arises is whether this tendency is based upon learning or cognitive processes. Generally, most researchers who have

investigated the 'learned helplessness' paradigm have tended to equate the illusion of control with superstitious behaviour (see Section 4.3.1). According to this view, people tend to repeat behaviours which they have found to be successful, or which have been previously associated with reinforcement; and this contrasts with Langer's explanation which is based upon cognitive and motivational factors, e.g., the desire to find order and meaning, and the confusion of chance and skilled situations.

At the present time, this problem remains unresolved, so that the application of findings from the two areas of research are difficult to reconcile. Nevertheless, it is possible that both explanations are of value, and that their explanatory power varies according to the nature of the task or situation. Learning principles may provide a useful way of explaining superstitious behaviours and false perceptions of control (e.g., Heslin, 1967; Oldman, 1974) in games where there is a relatively short interval between decision and outcome (see Chapter 2). However, such principles may be less useful in explaining the results of Langer's ticket experiments, where explanations based on regret, entrapment or personal luck appear to have greater validity. Moreover, the fact that many gamblers possess quite complex beliefs and strategies reduces the strength of learning-based explanations. Many of these 'gambling systems' are undoubtedly generated by considerable thought conducted away from the gambling venue. It is difficult to imagine that such systems could be entirely developed simply through the process of coincidental reinforcement. Despite this, it is likely that further studies exploring the links between learned helplessness and gambling may be of considerable theoretical interest.

4.8.5 Recent Approaches to the Study of Gambling-related cognitions: the 'speaking aloud' method

The criticisms raised in Section 4.8.3 concerning the methodological weaknesses of illusion-of-control research have been addressed by Gaboury and Ladouceur (1988), Ladouceur and Gaboury (1988), Ladouceur, Gaboury and Rochette (1988), and Letarte et al. (1986), who have argued that retrospective self-report measures are an ineffectual way of studying gambling-related cognitions. Such methods, they argue, increase the likely influence of socially desirable responding and may not provide an

accurate measure of what gamblers are thinking while they are gambling. As Letarte et al. (1986) write:

> *A puzzling fact emerged from these studies; although the subjects reported an objective perception of the gambling situation as measured by various paper and pencil instruments, an informal discussion with the subjects after the game was over indicated the presence of many irrational and subjective beliefs, which could be interpreted as an illusion of control. (p. 299).*

Consequently, in order to overcome these problems, Ladouceur and his associates developed a new methodology, the 'speaking-aloud' technique, which required subjects to speak aloud what they were thinking while they were gambling. It was argued that this would reduce the problems of recall bias associated with using retrospective measures. This method was first used by Gaboury and Ladouceur (1988) and subsequently by Ladouceur, Gaboury and Rochette (1988), Ladouceur, Gaboury, Dumont, and Rochette (1988). In both studies, it was found that 60-70% of gambling-related verbalisations were irrational. People perceived false patterns of cause and effect, e.g., "I won on 3 rows, so I'll do it again', erroneous strategies, e.g., "If I play three rows a few times, I will eventually win", personification of the machine/computer, e.g., " This machine is making me mad on purpose", and also made references to personal luck, e.g., "I'm lucky today, I should buy a lottery ticket".

Unfortunately, a limitation of these studies was that they involved students gambling in laboratory simulations, so it was not clear whether the results could be generalised to real-life gambling. Thus, in order to overcome this objection, Ladouceur, Gaboury, Bujold, Lachance, and Tremblay (1991) compared the percentage of irrational verbalisations produced by video-poker players in an artificial situation with that obtained in a field setting. The results revealed no significant difference in the percentage of irrational statements produced in the two situations, thereby confirming the validity of previous laboratory results.

A further question was whether this analysis could be extended to other activities which offered no possibility for skilful play. This possibility was investigated by Walker (1992b) in a study of regular poker machine players gambling in a club setting in New South Wales. Subjects were asked to speak-aloud their thoughts as they played and these verbalisations were recorded by a small tape-recorder. Walker's results showed that thirty-eight percent of total verbalisations, and eighty-percent of strategic, or

game-related cognitions, were irrational. Once again, consistent with Ladouceur et al.'s findings, these irrational verbalisations consisted of: superstitious beliefs or predictive systems, incorrect linking of cause and effect, personification of the machine, references to personal skill when this was impossible, or references to personal luck as a means of explanation or prediction. As a result, both Ladouceur and Walker have concluded that irrational thinking is likely to play a central role in maintaining gambling behaviour. However, as they also pointed out, it is still unclear whether the irrational thoughts are the cause of the behaviour or merely a reflection of it. As Walker (1992a) writes:

> *It is equally possible that irrational thinking is an interpretation of the experience of playing and that other, possibly non-cognitive factors cause the play itself....superstitious behaviours and the accompanying verbalisations would be expected according to learning theory based behavioural analyses. (p. 75)*

In other words, it was possible that the irrational verbalisations recorded may be little more than ad hoc justifications for behaviour that are only offered to fulfil the requirements of the experiment. Thus, as Walker suggests, more detailed studies were required to analyse the temporal relationship between verbalisations and events; in particular, whether thoughts typically follow or precede behaviour.

Furthermore, it was unclear whether irrational thinking was related to a person's involvement with gambling. That is, if irrational thinking was linked to persistence in gambling, would regular gamblers be more irrational than those who gambled only occasionally? This point was investigated by Griffiths (1994). In Griffith's study, two groups of fifteen adolescent slot-machine players were compared. Half of these were regular players (once/week or more), and the other half played less frequently than this. As in Walker's study, they were studied in a realistic venue and could keep all of their winnings. In general, Griffiths' results were similar to those of Ladouceur and Walker. A large percentage of the verbalisations were classed as irrational. However, it was found that the percentage was significantly higher in the sample of regular players, with the most noticeable difference observed in relation to 'personification of the machine'. Overall, the results suggested that a greater involvement in fruit-machine gambling does appear to increase the incidence of irrational beliefs. Regular players appeared to have a much stronger emotional involvement in the activity, which was

manifested by a tendency to treat the machine as a rival or opponent against which they competed, or with which they attempted to strike bargains.

In order to validate his experimental observations, Griffiths (1994) also administered a short questionnaire to the two groups of players. His aim was to determine whether the two groups would differ in their perceptions of skill in fruit-machine playing. As expected, he found that regular players were more likely to rate the activity as involving skill. Nineteen out of thirty regular players responded that the activity involved a moderate to high level of skill (i.e., 50% or more) compared with only eight out of thirty occasional players. Players reported that this skill arose from being able to pick the right machine and also knowing when to use the 'hold' feature. Although Griffiths emphasised that these beliefs were not entirely irrational in the sense that 'hold feature' allowed players to influence the symbols which appeared, he also pointed out that this feature was unlikely to influence the players' chances of winning. Therefore, his results confirmed that those who report a greater percentage of irrational beliefs, also tend to over-estimate their ability to influence outcomes, even in situations where the outcomes are largely determined by chance.

4.9 Cognitive Approaches to Gambling: Conclusions

In Chapter 2, it was emphasised that gambling is a paradoxical behaviour (Wagenaar, 1988; Walker, 1992a). Gambling involves an inevitable, or pre-determined element of chance and offers players very little chance of long-term profit. Nevertheless, as survey results have shown, people still gamble in the hope (if not the expectation) of winning money (Section 2.6). The cognitive approach to gambling is based upon the search for explanations to this seemingly irrational behaviour. It is argued that gambling is maintained by a series of false beliefs and erroneous perceptions which convince the gambler that he should persist. Such beliefs include: false beliefs about the nature of probability and randomness (gambler's fallacy and/or negative recency); a fear of missing out (simulation heuristics); biased evaluations or recollections of outcomes (self-serving attributions and availability heuristics); over-estimations of the amount of skill which can be used to influence gambling outcomes (illusion of control); and finally, general irrational beliefs, including the role of luck and superstitious rituals.

According to Walker (1985; 1992a), these cognitions serve to maintain a number of 'core irrational beliefs' relating to gambling, namely:

> *(1). That through persistence, knowledge and skill it is possible for a person to make money through gambling.*
>
> *(2). That although many will fail to achieve this goal, the gambler believes that s/he is different from other gamblers, and that s/he has the resources needed to win.*
>
> *(3). That persistence in applying oneself to the task will ultimately be rewarded.*
>
> *(Walker, 1992a, p. 136)*

The difficulty for gambling researchers, however, is identifying how these core beliefs emerge. As Griffiths (1995a) has noted, this is because of the dearth of information concerning the circumstances in which heuristics and biases are used. Although some field studies (e.g., Griffiths, 1994; Walker, 1992b) have provided evidence for the use of the illusory beliefs and biased attributions, no studies have sought to study each of these biases systematically, nor indeed to relate them to specific outcomes or gambling events. Griffiths (1995a) argues that this is partly because of the inconsistency with which people employ heuristics. From observation of fruit-machine players, he has concluded that cognitive biases may be of limited predictive value. People will use the same bias under varying circumstances, or else employ different biases for the same circumstances. However, this point has not been systematically investigated and is based upon only general impressions. Thus, an aim of the present research investigation was to examine the validity of Griffith's argument in relation to poker machine gambling in South Australia. This was undertaken by recording both cognitions and machine events simultaneously, and also by asking subjects in two studies to verbalise information relating to particular heuristics.

Section B

Survey Studies of Gambling in South Australia

Chapter 5

Study 1: Community Gambling Patterns

5.1 Overview

The first study in this research project was a community gambling survey undertaken in metropolitan and regional South Australia during 1996. This was the first survey of its type undertaken in the State, and was conducted two years after the introduction of gaming machines to clubs and hotels. Based upon previous studies conducted in Australia (Dickerson, Baron, & O'Conner, 1994; Dickerson, Walker, & Baron, 1994; Dickerson, Baron, Hong, & Cottrell, 1996), New Zealand (Abbott & Volberg, 1996) and in the United States (Volberg & Steadman, 1992), this study had two important aims. The first was to determine the percentage of people in South Australia who gambled during 1996, and the percentage who were experiencing gambling-related problems. The second was to examine the correlates of gambling behaviour; in particular, whether gambling or problem gambling, was associated with certain demographic characteristics or types of gambling activity. In the following sections, a brief description of the South Australian gambling market is provided, along with a summary of previous research which forms a background for the hypotheses investigated in this study.

5.2 The South Australian Gambling Market

5.2.1 Range of Gambling Products

In most regards, the South Australian gambling market is very similar to that in other Australian States. The market is made up of five major classes of gambling activity including: (a). Lotteries, (b). Gaming machines, (c). Casino games, (d). Bingo/raffles and (e). Sports and Racing. As shown in Table 5.1, these categories differ considerably in the range of activites which they encompass and also in their availability. The most widely distributed type of gambling in South Australia are lottery games, which are available in Lottery outlets, newsagents and shopping centres all over the State, closely followed by gaming machines which are available in a large

percentage of clubs and hotels. By contrast, the least available activities are casino activities such as dice, cards and roulette which can only be played at the central Adelaide Casino.

Table 5.1 Activities available in South Australia in 1996-1997.

Type of Activity	Locations Where Available	Sub-classes of activities	Points to Note
(a). Lotteries	Lottery outlets Newsagents Shopping centres	Cross-Lotto Powerball Super-66 Pools Keno Instant lotto	Cross-Lotto,Power-Ball, Super 66, and Pools are all drawn once or twice per week. Games of keno occur every 15 minutes.
(b). Gaming Machines	Licensed Clubs Hotels	Spinning Reel, Fruit or poker machines Video cards Video keno	All fruit or poker machines in South Australia are electronic rather than mechanical.
(c). Casino Games	Adelaide Casino	Card games Dice games Roulette Two-up (coin-tossing)	The Casino also has gaming machines and keno.
(d). Raffles/ Bingo	Bingo Halls Lottery outlets Shops Supermarkets	Club bingo Raffles	Most bingo halls are run by private charities.
(e). Racing and Sports	Off-course betting agencies Track/Matchside Bookies	Gallops Harness racing Sports betting	Over 70% of bets are now placed by telephone.

(a). Lottery Games

In South Australia, there are four public (or 'TV') lotteries (Cross-lotto, Powerball, Super-66 and Pools), which are held at least once per week. The largest of these is Cross-lotto, which involves a pick of 6 numbers from 45 without replacement, (first prize approximately $1-1.5m.) and Powerball, (average prize $2-3m.) which is the same as Cross-Lotto, except that the final number is selected from a fresh batch of 45 numbers (odds approximately 1: 54 million against). Super-66 and Pools are similar, but involve drawing six numbers (range 1-10) with replacement. In Keno, players choose one to ten numbers from a total of 100 and hope that the twenty numbers randomly selected contain one's selection (or at least part of it). Games of keno are

presented every fifteen minutes on video monitors displayed in most shopping centres, news-agents, lottery outlets, the central suburban casino, and in most hotels and clubs. As with the other lottery games, each game of keno only costs between $1 and $2 and offers prizes ranging from a few dollars to $2m. Finally, the Lotteries Commission also sells 'instant-win' bingo, or 'pull-tab' tickets (see Aasved & Schaefer, 1995). These games usually cost between $2 and $5 and involve players having to rub off panels and pull up tabs in the hope of obtaining lucky combinations of symbols. Prizes range from $1-2 to $5000 to $10,000. With the exception of Power-ball, these activities have all been available in South Australia for over 15-20 years.

(b) Gaming machines

South Australia has over 9000 gaming machines. Over 800 of these are in the central urban casino; the rest are in over 300 licensed clubs and hotels (minimum 4 machines, maximum 40). These machines contain three types of game: spinning reel symbol games, which involve pressing buttons or pulling levers to obtain certain combinations of winning symbols; video-keno, a computerised version of keno; and video-card games, including blackjack and poker. Machines allow a maximum pay-out of $10,000 with the minimum bet-size ranging from 5c per spin to $1 per spin or turn. The spinning reel machines have only been available in South Australia since July 1994, whereas video-keno and video card games have been available in the Adelaide Casino since 1991.

(c) Casino games

These games are only available at the Adelaide Casino, which opened in 1985 (NB. This is the only casino in South Australia). Casino games include card and dice games such as blackjack, baccarat, poker, craps, mini-dice, and also roulette. Games range in cost from $1 per bet to $25 or more.

(d) Racing and Sports Betting

This type of betting is mostly conducted through the Totaliser Agency Board (TAB) by the direct lodging of betting slips or by telephone. A smaller percentage of bets are placed with bookies located at the racing or sporting venues. Thoroughbred (or gallops) races are run approximately every 10-15 minutes between 12 noon and 5 p.m.,

whereas greyhound and harness races (pacers, trots) are usually run during the evening.

(e). Raffles/ Bingo

These activities are usually conducted privately by charity or community organisations. The cost per game is usually only $1 or $2.

5.2.2 Gambling Expenditure

Despite having a similar range of gambling options, South Australia has a relatively low per capita expenditure on gambling compared with most other Australian States. As shown by the National Statistics collated by the Tasmanian Gaming Commission (1995), South Australian expenditure in 1994-95 was only $372 per capita, and this was considerably less than the amount spent in other States, e.g., $722 in New South Wales, $628 in Victoria, $547 in Western Australia, $530 in Queensland, and $425 in Tasmania. This figure of $372 represented a total expenditure in 1994-95 of approximately $487m. with $187m. (38%) spent on gaming machines, $120m. (25%) spent on lotteries, $96.1m (20%) spent on sports and racing, $83.6m. (17%) spent at the Adelaide Casino.

5.3 Assessing the Prevalence of Gambling Problems

5.3.1 Overseas Research

Although large-scale gambling surveys have been conducted for over 20 years, (e.g., Kallick-Kaufmann, 1979; Kallick et al., 1979), it is only relatively recently that more concerted attempts have been made to examine the effects of excessive gambling upon the wellbeing of the community (Dickerson, McMillen, Hallebone, Volberg, & Wooley, 1997; Ladouceur, 1996; Volberg, 1997; Walker & Dickerson, 1996). This research began with the work of Volberg in the mid-1980s (see Volberg & Steadman, 1992) and was coterminous with the rapid expansion of the gambling industry in the United States and Canada, and also coincided with the development of the first validated psychometric measure of problem gambling: the South Oaks Gambling Screen (SOGS), Lesieur and Blume (1987), a measure based upon the existing DSM-III and DSM-IV criteria for problem gambling.

The SOGS is a 20-item scale consisting of a series of statements relating to aberrant gambling behaviours, including: chasing losses, being unable to resist the urge to gamble, concealing the extent of one's gambling, and borrowing money to gamble. The scale was validated using clinical samples of problem gamblers and was found to be a valid and reliable way of distinguishing problem gamblers from non-problem gamblers. For each item, respondents were asked to say whether the statement had 'ever' applied to their gambling during their lifetime. Those who scored 3-4 points were classified as probable pathological gamblers, whereas those who scored 5 or more were classified as pathological gamblers. This 'lifetime' version of the scale was used in a series of studies by Volberg in the period 1986-1990 (Maryland, New Jersey, Conneticut, Massachusetts, New York, and Iowa), Volberg and Steadman (1992), and showed that between 1% and 2.7% of people could be classified as pathological gamblers. However, a difficulty with the studies was that it was unclear whether this lifetime estimate provided a valid assessment of the 'current prevalence' of problem gambling (Walker & Dickerson, 1996). A person could, for example, have almost given up gambling, and yet still score five or more points because of the retrospective nature of the measure, and this could substantially inflate the prevalence estimates obtained.

Thus, in response to this criticism the SOGS-R was developed. This was a revised version of the SOGS that allowed researchers to obtain both current (6 months) and lifetime estimates of problem gambling. In this version, respondents were administered the scale twice: first, with a life-time focus (i.e., 'have you ever...') and second in reference to the last 6 months (i.e., during the last 6 months have you...). This scale was administered by Volberg in 10 American States during the period 1990-1996 (Washington, California, Texas, Louisiana, Mississippi, Georgia, Montana, Minnesota, North and South Dakota) and revealed lifetime estimates of between 1% and 3.1% and current estimates of between 0.5% and 2.1% (Dickerson et al., 1997). Similar studies conducted in Canada during the 1990s (e.g., British Columbia, Alberta, Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, see Dickerson et al., 1997 or Ladoucueur, 1996, for a review) obtained very similar results with lifetime estimates ranging from approximately 1% to 3%) and current estimates of between 0.8% and

1.4%. Similar figures have also been obtained in Spain by Becona (1991) and Becona and Fuentes (1994), and in New Zealand by Abbott and Volberg (1996).

5.3.2 Australian Research

By the time when the present study was undertaken, four previous prevalence studies had been conducted in Australia: a national study in 1991 (Dickerson, Baron, Hong, & Cottrell, 1996), a Tasmanian study in 1994 (Dickerson, Walker, & Baron, 1994), a Western Australian study (Dickerson, Baron, & O'Conner, 1994) and a New South Wales study (Dickerson, Allcock, Blaszczynski, Nicholls, Williams, & Maddern, 1996). Consistent with Volberg's later studies, these studies all used a 6-months or 'current version' of the SOGS. However, there were also a number a differences. First, only those people identified as regular gamblers (i.e., weekly or more frequent participation on a preferred type of gambling) were administered the SOGS. This was justified on the ground that that occasional or binge gamblers would be unlikely to exist in Australia because of the availability of gambling opportunities. Second, a much higher cut-off score was used (usually 10 or more) as a result of concerns that a score of 5 would significantly overstate the prevalence of problem gambling (Allcock, 1995; Solonsch, 1991c). Third, scores on the scale have been interpreted as indicating the likelihood of 'risk' that respondents were experiencing gambling-related problems.

This revision of the cut-off score for the SOGS was based upon studies which have shown that many of the items 'are overinclusive when applied in the Australian context' (Dickerson et al., 1997, p. 23). Solonsch (1991c), for example, found that over 20% of regular racing punters will be classed as problem gamblers if the five point criterion is used, whereas Ohtsuka, Bruton, Borg, DeLuca, and Imms (1995) have found that 40% of regular poker machine players can be similarly classified. As a result of this problem, Dickerson et al. (1996) attempted to establish an Australian norm for this scale based upon a clinical sample of problem gamblers. Based upon this sample, it has been argued that all people who score ten points; fifty percent of those scoring seven to nine points; and twenty five percent of people who score five or six points should be classified as being 'at risk' of being problem gamblers. Using this method, considerably more conservative prevalence estimates have been found: New South

Wales (1.72% scored 5-9 points, 0.50% scored 10+) compared with (0.24% and 0.32% for Western Australia), (0.98% and 0.16% for Tasmania).

Lesieur (1996) has recently criticised the design of Australian studies on the grounds that the exclusion of non-regular gamblers ignores the problems experienced by non-regular gamblers, and that Dickerson et al.'s clinical sample might not be representative of the problem gamblers out in the community (the 'Warden's fallacy'). However, these criticisms ignore previous Australian research (e.g., Dickerson, 1993; Dickerson & Hinchy, 1988) which has revealed that gambling-related problems are rarely observed in samples who gamble less frequently than once week. Moreover, Lesieur also appears to ignore the fact that the validation procedure utilised by Dickerson et al. (1996) is very similar to that used by Lesieur himself in the development of the SOGS, namely, the use of clinical samples to establish a valid cut-off score to distinguish problem from non-problem gamblers.

Therefore, despite its limitations, the SOGS is the only measure of problem gambling with acceptable internal reliability, established concurrent validity with the DSM-IV classification: Abbott and Volberg (1996) showed that 31% of variance in the DSM-IV can be accounted for by the SOGS; moreover, Baron et al. (1995) have found a correlation of approximately 0.9 between the final version of their 'Scale of Impaired Choices' and the '6 months' version of the SOGS), and which has been used extensively around the world. For these reasons, the 6-months version of the SOGS is also used in the present study to allow comparisons with previous Australian studies.

5.4 Hypotheses

5.4.1 Demographic Differences

Based upon previous research discussed in Chapter 3 and 4, a central aim of this research was to determine the overall level of participation in gambling in South Australia, the prevalence of problem gambling, and whether these varied according to specific demographic characteristics and type of gambling activity. Using the information presented in Table 3.1, it was predicted that gender, age, socio-economic status and personal status would be significantly related to gambling involvement and the prevalence of gambling problems. It was predicted that women would be less likely

to have gambled on casino gambling, racing and sports-betting, but would be more likely to have gambled on lottery games and poker machines. Women should also spend less money on gambling than men and experience fewer gambling-related problems. A similar pattern of results was expected for age. Older subjects should have a lower involvement in skilled games (e.g., Casino games and racing), but a higher involvement in chance activities such as lotteries, bingo and those played on poker machines. Older people should also spend less on gambling than younger subjects and experience fewer gambling-related problems. These problems are predicted to be most commonly observed in younger or middle-aged gamblers. It was further predicted that gambling would be related to personal status, with unmarried (e.g., divorced, separated or single people) more likely to gamble and to experience gambling-related problems than those who are married or pensioners (NB. This is undoubtedly related to the advanced age of most pensioners). This is based upon the assumption that 'unattached' people have more time to gamble and presumably more disposable income to spend on leisure activities. Finally, it was predicted that socio-economic status (SES) would be related to gambling, with gambling-related problems most likely to be observed in lower socio-economic groups (Volberg & Steadman, 1992).

5.4.2 Variations in relation to Gambling Activities

Consistent with Dickerson's (1993) and Walker's (1992a) suggestions that problem gambling is more likely to be associated with continuous types of gambling (see Chapter 2), it was predicted that poker machines, racing and casino activities would be associated with a greater incidence of gambling-related problems, with fewer problems being associated with non-continuous activities such as lotteries.

5.4.3 Statewide Comparisons

It was predicted that the prevalence of problem gambling would be lower than in New South Wales because of the lower per capita gambling expenditure in South Australia, but that this study would obtain a higher figure than obtained in Tasmania and Western Australia because neither of these states had poker machines in clubs and hotels when they were surveyed. The absence of poker machines in these states would reduce the overall availability of continuous gambling activities.

5.5 Methodology

5.5.1 Subjects

The data for this survey were collected by a leading marketing firm, Morgan Research Centre Ltd. (Adelaide Branch) in July 1996. A total of 3064 households were contacted in metropolitan Adelaide and in regional South Australia. Twenty-four percent (n=735) refused to be interviewed, 6.5% (n=2000 terminated the survey mid-interview, 10% (n=317) were 'no-replies', with a final sample of 1206 residents (aged 18 or more) finally obtained. Individuals households were selected randomly from the current white pages listings and interviewed using a CATI (computer aided telephone interview) system. A total of 812 interviews were obtained from the metropolitan area and 394 from the regional areas. Individuals, aged over 18 years were randomly selected within households. No quota system was used. Instead, the data were post-weighted according to the probability of selection within each household. The data-set was then further weighted by sex, age and part of state so that the demographic composition of the sample reflected that of the general South Australian population. Full details of the final sample is included in Appendix B).

5.5.2 General Survey Design

The survey had three sections. In the first section, respondents were asked whether they had gambled on a variety of activities during the previous twelve months. These activities are described above in Table 5.1 and were grouped into 12 categories: lottery games (Cross-Lotto, Powerball, Super-66 and Pools, bingo games (club bingo and scratch tickets), horse racing, other racing (harness racing, greyhounds), sports betting, poker/fruit machines, video card games, video keno, casino card and dice games, and a miscellaneous category. Those respondents who said that they had not gambled during the previous 12 months, were asked to provide demographic details. Those who had gambled responded to questions in Section 2, which asked them how often they played each activity, expenditure per session, and the amount typically spent and lost per week on gambling in general.

Those gamblers who said that they gambled at least once per week on one or more types of gambling were administered the South Oaks Gambling Screen. They were also asked another series of more general questions relating to the psychological, social and

economic effects of gambling upon their lives. These were adapted from earlier studies conducted by Dickerson et al. (1991, 1994, 1995, 1996). People were asked whether they had suffered depression as a result of their gambling, whether gambling had affected an important relationship in their lives, and affected the quality of their family lives. They were also asked whether they owed money because of gambling, had gambling-related debts, had lost a job from gambling, and whether they had gambled more than they could afford. Finally, gamblers (and also non-gamblers) were asked to provide demographic details including: gender, age, work-status, type of work (if working), status (if not working), estimated household income and marital status.

Each interview had a mean duration of 15 minutes. Interviewers were allowed up to 4 callbacks to obtain the 'correct' randomly selected person before selecting another household to contact.

5.6 Results

5.6.1 General Involvement in Gambling Activities

Analysis of the overall results revealed that of the total sample of 1206 people, 79% (n=948) had gambled at least once during the previous twelve months, with 21% (n=258) having not gambled. The percentage involvement was significantly higher in the regional areas (83%) compared with the Adelaide Metropolitan Area (76%), as found using a proportion difference test, $z = 2.75$, $p < .05$. In addition, it was found that 31% (n=381) of the sample had gambled at least once per week on at least one type of gambling. Most of this regular gambling was accounted for by people playing lotteries (i.e., 241/1206= 19% lotto only vs. 140/1206= 12% for other types of gambling).

5.6.2 Involvement in each of the 12 Activities

An analysis was also undertaken to examine the percentage of South Australians involved in each of the twelve types of gambling. The results of this analysis are presented in Figure 5.1 which shows the percentage of people who had gambled on each of the activities at least once during the previous twelve months. As can be observed, the most commonly played activity was lotto (58%). Poker machine gambling was the second most popular activity (42%) and bingo games third (36%).

The next highest percentages were recorded for horse racing (19%) and keno (15%). All other activities, including the casino games, other racing (i.e., greyhounds and harness-racing) and sports-betting were played by less than 10% of the total sample.

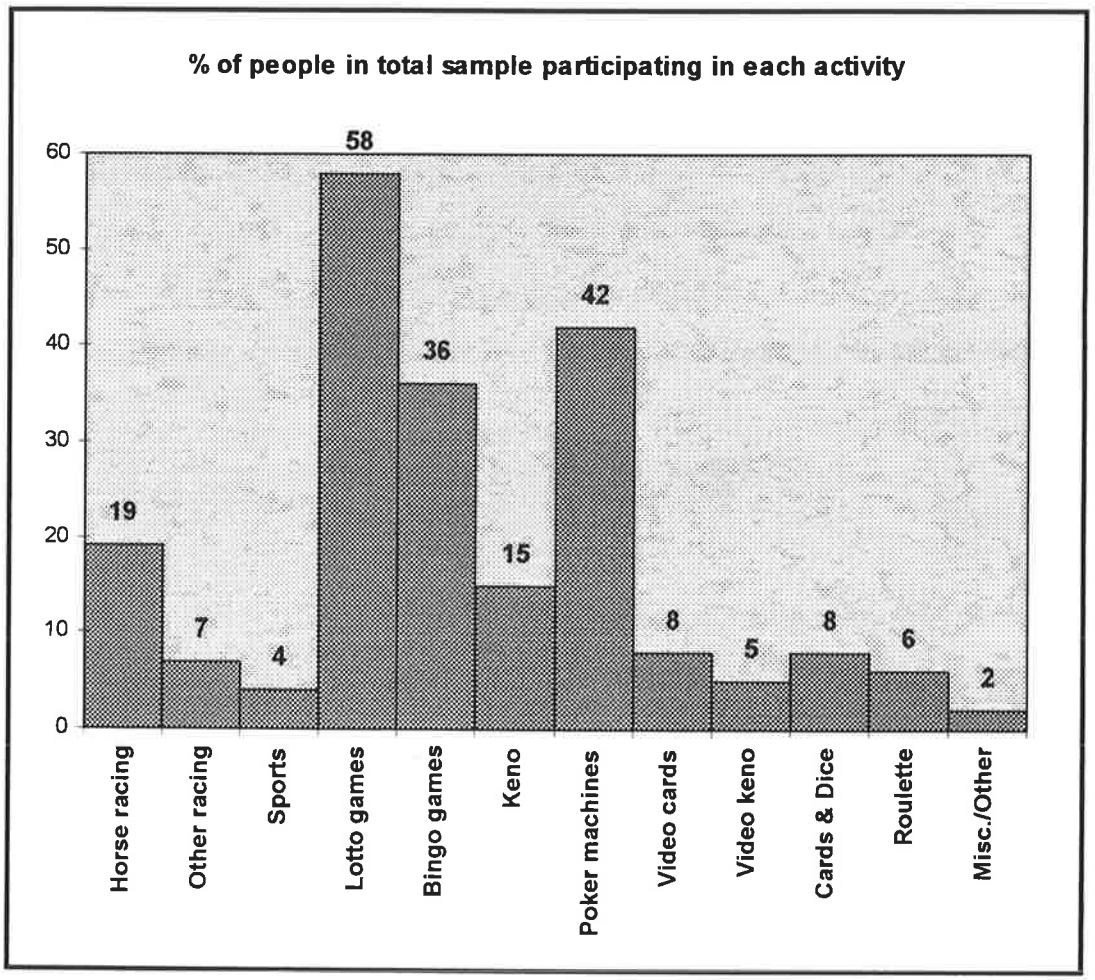


Figure 5.1 Percentage of people in total sample (n= 1206) participating in each type of gambling activity

5.6.3 Frequency of Involvement in each Activity

The frequency with which people gambled on each of these activities is displayed in Table 5.2. From these figures, it can be seen that 26% of the total sample played lotto once per week compared with only 5% for poker-machines and bingo games. Only 0-2% of people engaged in any of the other activities on a weekly basis.

Table 5.2 Percentage of gamblers on each activity who participated weekly, monthly, or less often (Base:n=1206)

Activity	% Less than 1/month	% 1-3 times per month	% Once per week+
Horse racing	13	3	2
Other racing	4	2	1
Sports	3	<1	1
Lotto games	24	9	26
Bingo games	24	7	5
Keno	11	3	2
Poker machines	32	5	5
Video cards	7	1	1
Video keno	4	<1	<1
Cards/Dice	7	<1	<1
Roulette	5	<1	0
Misc./Other	2	1	<1

5.6.4 Gender Differences in Participation

An analysis of the overall involvement figures showed that gambling was equally popular in men and women. Eighty-one percent of men had gambled at least once during the previous 12 months compared with 77% of women (not significantly different). However, as Figure 5.2 shows, despite similarities in overall involvement figures, there were a number of gender differences in the types of gambling activity preferred. Men were significantly more likely to have gambled on horse racing (23% vs. 14%, $z=3.98$, $p < .01$), on other racing activities (10% vs. 4%, $z=4.35$, $p < .01$), on sports (8% vs. 1%, $z=6.11$, $p < .01$), keno (18% vs. 13%, $z=2.43$, $p < .01$) lotto games (62% vs. 55%, $z=2.46$, $p < .01$), video cards (12% vs. 4%, $z=4.86$, $p < .01$), cards and dice (11% vs. 5%, $z=4.68$, $p < .01$) and roulette (8% vs. 3%, $z=3.73$, $p < .01$). Women were significantly more likely to have gambled on bingo games (31% vs. 41%, $z=3.62$, $p < .01$), but no noticeable differences were observed for poker machines or video keno. A second analysis examined gender in relation to relative frequency of gambling on each activity (Table 5.6).

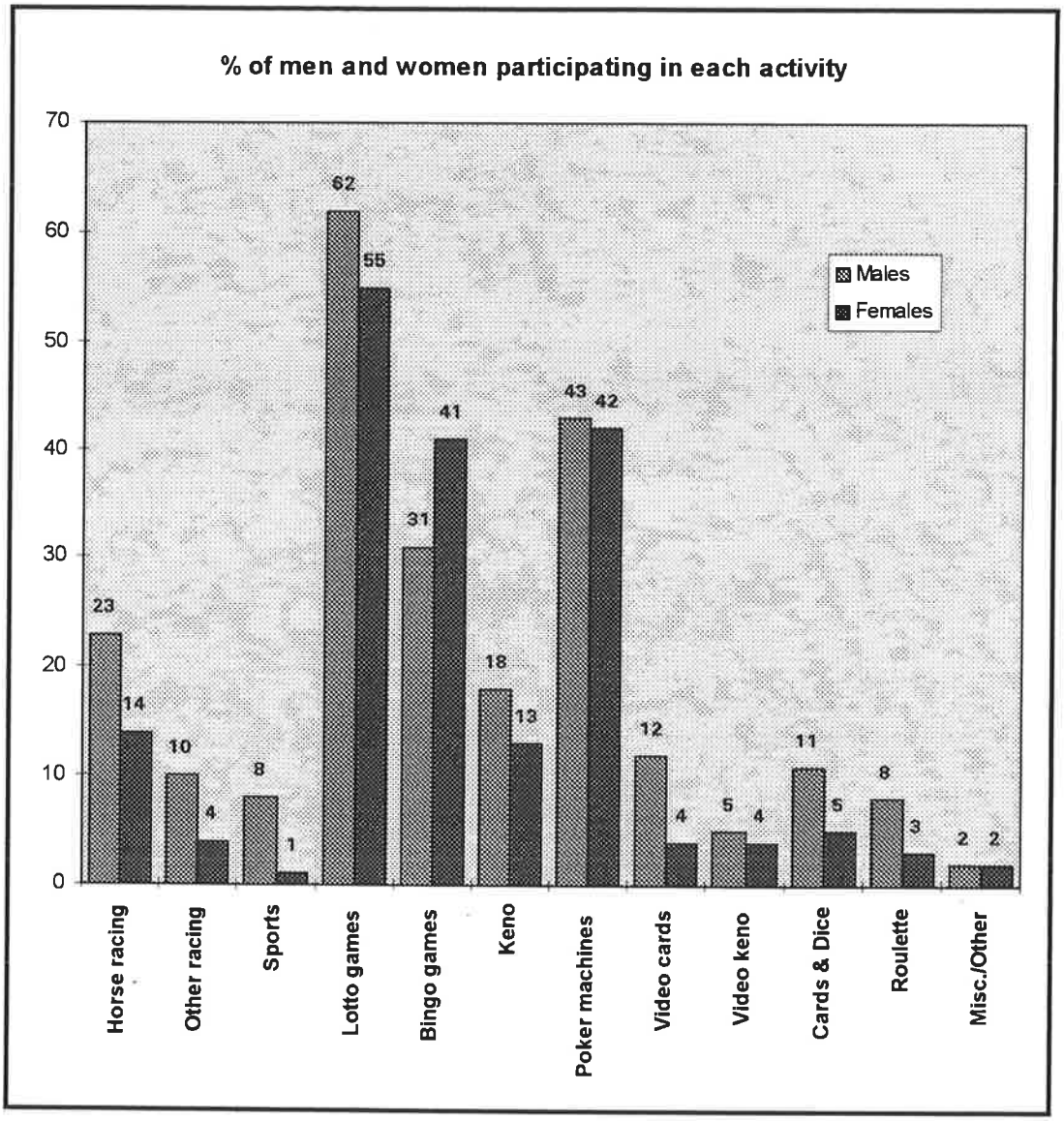


Figure 5.2: Percentage of men and women involved in each activity

Note:

The significant gender differences depicted in Figure 5.2 are further highlighted if the total number of participants in each activity is divided into the percentage of men and women. This analysis is summarised as follows: horse racing (62% male, 38% female), other racing (73% male, 27% female), sports (87% male, 13% female), keno (56% male, 44% female), video cards (73% male, 27% female), cards and dice (70% male, 30% female), roulette (73% male, 27% female). Poker machines were played equally by both sexes, with males making up exactly 50% of the total number of players.

Chi-square analysis of the results in Table 5.3 revealed a significant association for horse racing, with men significantly more likely to have gambled frequently on this activity than females, $\chi 2$ (2) = 9.14, $p < .05$. Thirty four percent of the men who gambled on horses participated on at least a monthly basis compared with 20% of women. However, no other statistically significant associations were observed for the other activities. The results suggest that the popularity of lotto games and poker machines in South Australia is largely attributable to the fact that these are the only activities which attract a large number of players of both sexes. Conversely, the lack of popularity of other activities such as racing and casino games appears related to the fact that these activities do not appear to have the same appeal for women.

Table 5.3 Gender differences in relation to the frequency of gambling on each activity (female percentages in brackets)

Activity	% Less than 1/month	% 1-3 times per month	% Once per week+	% Total who participated
Horse racing†	65 (80)	17 (15)	17 (5)	138 (86)
Other racing	60 (74)	13 (15)	27 (11)	60 (22)
Sports	72 (86)	14 (0)	14 (14)	46 (7)
Lotto games	39 (43)	17 (13)	44 (44)	364 (341)
Bingo games	64 (73)	22 (14)	14 (13)	187 (248)
Keno	67 (75)	22 (14)	11 (10)	103 (82)
Poker machs.	74 (78)	13 (12)	13 (9)	253 (257)
Video cards	83 (86)	8 (14)	8 (0)	73 (27)
Video keno	91 (91)	4 (0)	4 (9)	30 (27)
Cards/Dice	94 (96)	5 (4)	1 (0)	65 (28)
Roulette	91 (100)	9 (0)	0 (0)	49 (18)
Misc./Other	70 (67)	30 (17)	0 (16)	14 (13)

1. Not all figures will add up to 100% because of slight rounding differences and refusals.
2. '†' statistically significant association ($p < .05$) between gender and frequency of participation using $\chi 2$ test.

5.6.5 Age Differences in Participation Rates and Frequency of Gambling

A comparison of overall participation rates in the six age categories revealed a significant difference between the percentage of people who had gambled at least once during the previous 12 months: 71% for the 18-24 age-group, 83% for 25-34 year olds, 80% for 35-44 year olds, 81% for 45-54 year olds, 76% for 55-64 year olds and 73% for people aged over 65 years, $\chi 2(5)=13.1$, $p < .05$. Further analyses examined age in relation to the percentage of people participating in the 12 activities . The results of the first analysis are displayed in Figure 5.3 and are summarised below. The '+' and '-' signs in the dot point summary refer to the amount by which the percentages differed from the overall sample percentages in Figure 5.1.

- Horse and Other racing: (significant association between age-group and participation, $\chi 2 (5)=13.1$, $p < .05$): less likely to have been played by people aged 65+ years (-7%).

- Sports: (significant association with age-group, , $\chi 2(5)=26.3$, $p < .01$): more likely to have been played by people aged 18-34 years (+4%).

- Lotto games: (significant association with age group, $\chi 2(5)=47.1$, $p < .01$): less likely to have been played by 18-24 year olds (-20%) and 65+ year olds (-7%), but more likely to have been played by 35-44 year olds (+10%) and 45-54 year olds (+7%).

- Keno: (significant association with age group, $\chi 2(5)=21.6$, $p < .01$): less likely to have been played by people aged 55+ years (-6%), but more by 35-54 year olds (+5-6%).

- Poker machines: (significant association with age-group, $\chi 2(5)=17.4$, $p < .01$): more likely to have been played by 25-34 year olds (+8%) and 45-54 year olds (+7%), but less likely to have been played by people aged 65 years or more (-9%).

- Video card games: (significant association with age-group, $\chi 2(5)=112.4$, $p < .01$): played more often by 18-24 year olds (+10%), 25-34 year olds (+7%), but less likely to have been played by people aged 55 years or over (-7%).

- Video keno: (significant association with age-group, $\chi 2(5)=27.9$, $p < .01$): played more often by people aged 18-24 years (+6%).

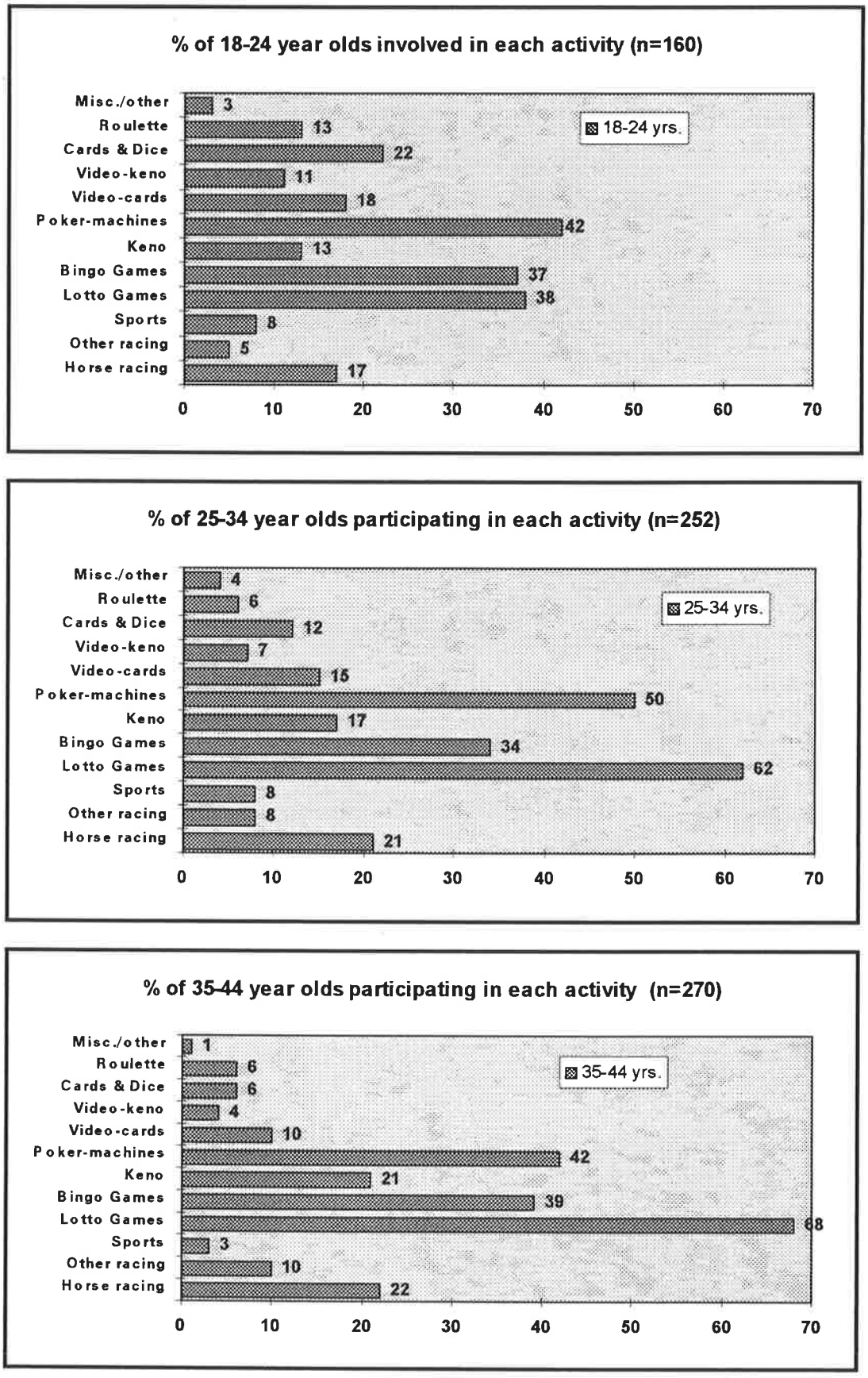
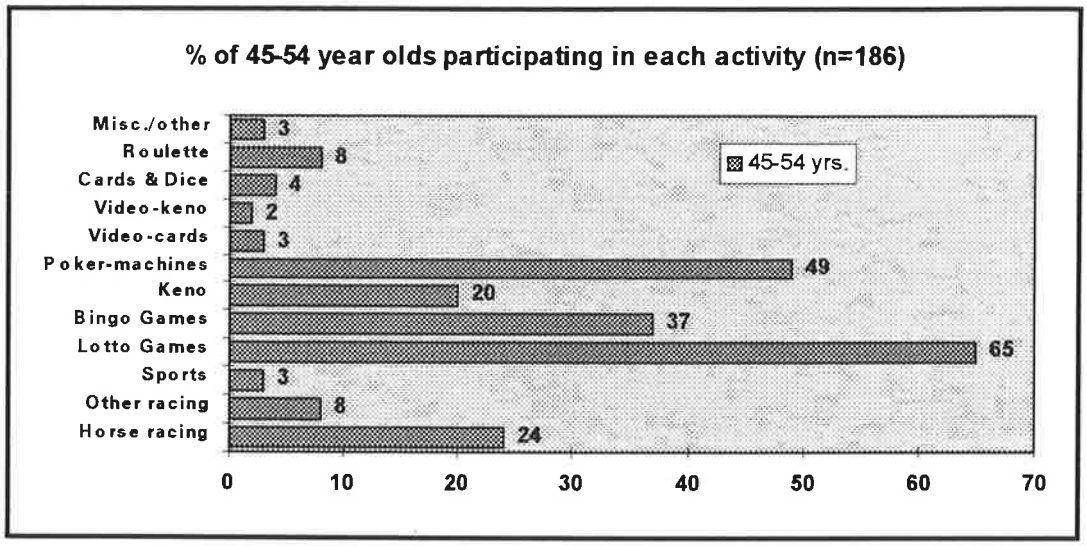
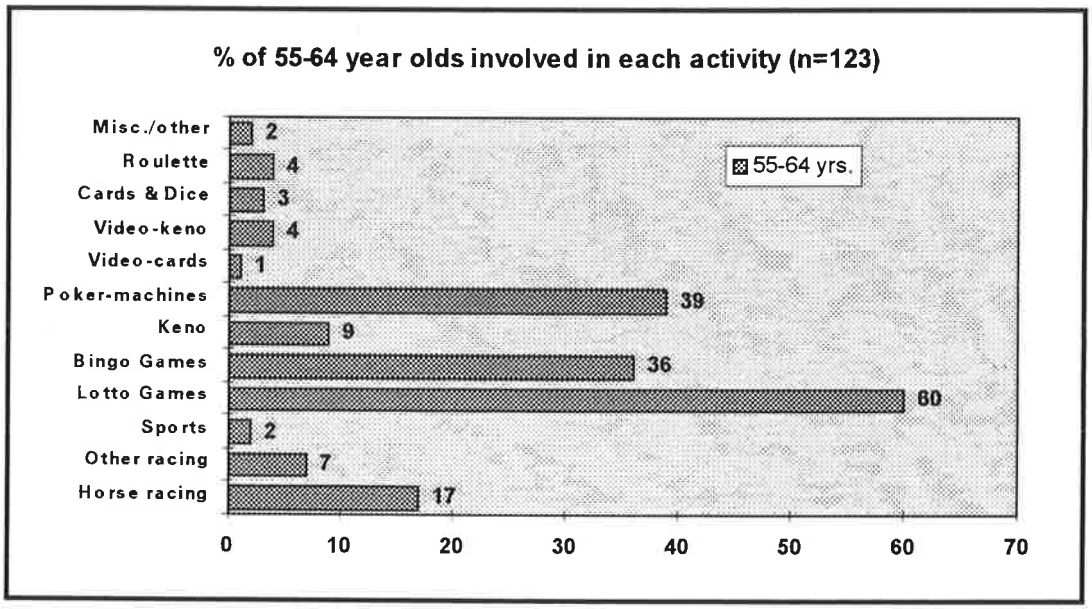


Figure 5.3: Participation in each activity in relation to age-group





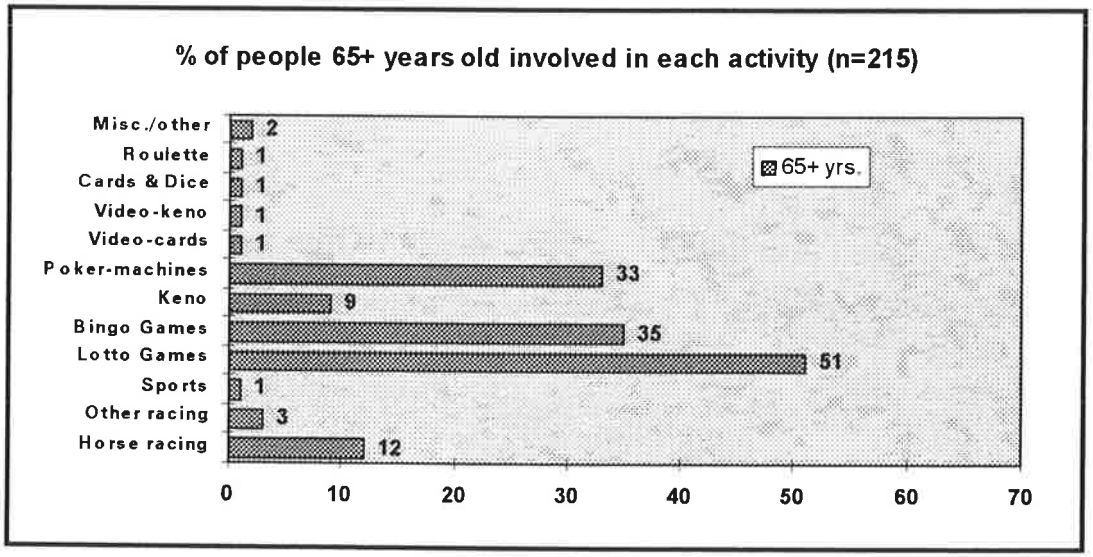


Figure 5.3 (cont.): Participation in each activity in relation to age-group

- Cards & Dice: (significant association with age-group, $\chi 2(5)=73.1$, $p < .01$): more likely to have been played by 18-24 year olds (+14%) and less likely to have been played by people aged 65 or over (-7%).

- Roulette: (significant association with age-group, $\chi 2(5)=25.9$, $p < .01$): more likely to have been played by 18-24 year olds (+7%).

People in the six age groups were also compared in relation to how often they gambled on each activity (Table 5.4). The results revealed a significant association between age group and the frequency with which people gambled on lotto games, $\chi 2(5)=13.1$, $p < .01$, bingo games, $\chi 2(5)=14.2$, $p < .05$, and keno, $\chi 2(5)=13.1$, $p <.05$. For example, people aged 18-24 years were less likely to have played lotto on a monthly basis (26% below sample average), whereas people in the other categories were more likely to have played, e.g., (19% above average) for the 55-64 age category, (19% above average) for the 45-54 category and (6% above average) for people aged 35-44 years when compared with the overall sample percentage. Bingo games were more frequently played by older people. Frequent poker machine gambling was most common amongst people aged 45-54 years (14%) and least common amongst people aged 35-44 years, although the association was not significant.

Table 5.4 Percentage of people in each age group who gambled at least once per month on the 12 activities

Activity	% 18-24	% 25-34	% 35-44	% 45-54	% 55-64	% 65+
Horse racing	8	4	6	7	5	4
Other racing	4	2	3	3	2	1
Sports	3	2	<1	1	0	<1
Lotto games†	9	32	42	44	44	36
Bingo games†	10	8	9	17	14	15
Keno†	6	4	6	8	2	2
Poker machines	10	9	7	14	11	11
Video cards	6	1	<1	0	0	0
Video keno	0	1	<1	1	0	0
Cards/Dice	0	3	0	1	0	0
Roulette	0	2	0	1	0	0
Misc./Other	2	<1	0	2	0	1
Number (n)	160	252	270	186	123	215

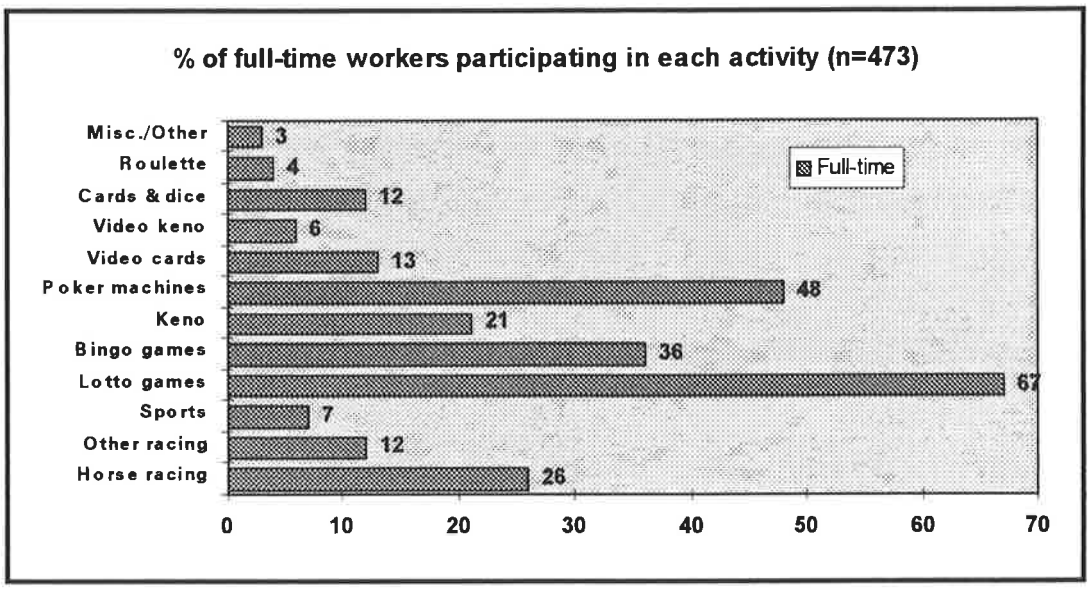
† denotes significant association between age and frequency of gambling using $\chi 2$ test.

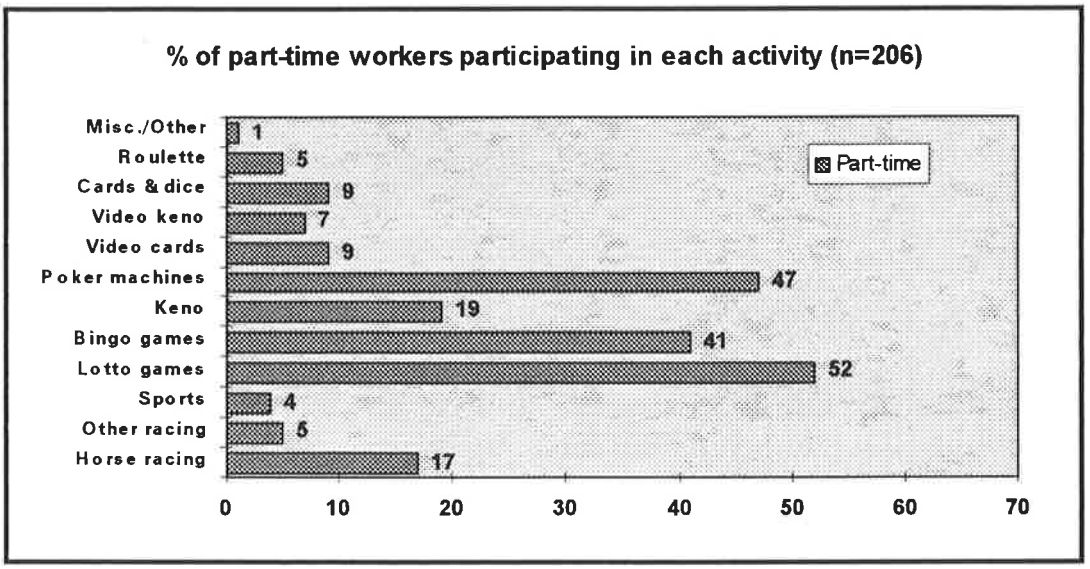
Summary of Findings

The results revealed a curvilinear relationship between overall gambling participation and age. Participation was highest in those aged over 25 years, but lower in the very young (18-24 years) and in the elderly (65+ years). The trends for the individual activities was less clear. It was predicted that younger respondents would prefer activities that are more 'cognitively complex', whereas older subjects would prefer chance games. Both of these findings were generally supported. The 18-24 year olds were significantly less likely to have gambled on lotteries, but were more likely to have gambled on casino card and dice games, sports-betting, video card games, roulette, all of which require players to have some knowledge or skill (i.e., allow greater cognitive involvement, even there is no possibility for skilful play). Younger people were not, however, less likely to have gambled on poker machines or keno (i.e., chance games). Older people were less likely to have gambled on racing activities, video card games, casino card and dice games. However, contrary to predictions, they were no more likely to have gambled on chance games, e.g., lotteries and poker machines. Gambling on these activities was most common in people in the 'middle-age' groups, which was consistent with the pattern observed for overall participation levels.

5.6.6 Participation Levels and Frequency of Gambling in Relation to Current Work Status (SES Measure 1)

Based upon the question 'Are you in paid employment?', people were classified as full-time workers, part-time workers and 'non-workers'. Full-time workers were significantly more likely to have gambled at least once in the previous 12 months (85%) compared with part-time (78%) and 'non-workers' (73%), $\chi 2(2)=21.1$, $p < .01$. Further analyses of the percentage of people in each category involved in each of the 12 activities are shown in Figure 5.4. Inspection of Figure 5.4 (and chi-square tests) showed that 'non-workers' were significantly less likely to have gambled on horse racing, $\chi 2(2)=29.4$, $p < .01$, other racing, $\chi 2(2)=26.2$, $p < .01$, sports, $\chi 2(2)=27.1$, $p < .01$, and lotto games, $\chi 2(2)=24.5$, $p<.01$, keno, $\chi 2(2)=30.1$, $p < .01$, poker machines, $\chi 2(2)=16.2$, $p < .01$, video cards, $\chi 2(2)=33.7$, $p < .01$, and cards and dice, $\chi 2(2)=29.6$, $p < .01$. Full-time workers were significantly more likely to have gambled on lotteries than part-time workers.





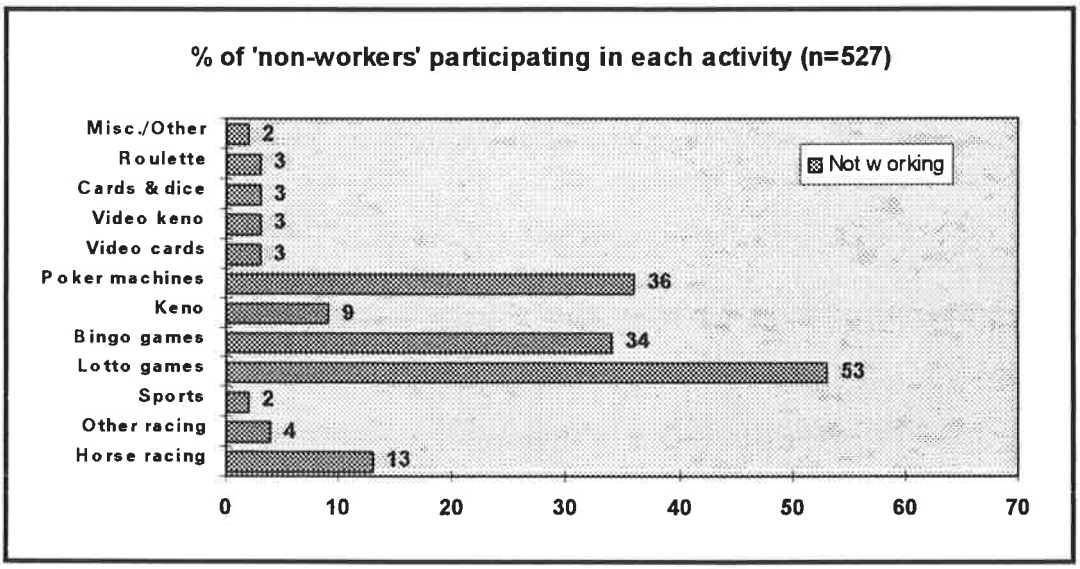


Figure 5.4: (cont.) Participation in each activity in relation to work status

There was, however little association between work status and the frequency with which people gambled on each activity (Table 5.5). The only significant association was observed for lotteries, $\chi 2(2)=22.2$, $p < .01$, in which it was found that full-time workers were more likely to have gambled on a monthly basis compared with the other two groups.

Table 5.5: Percentage of people in each 'work status' category who gambled at least once per month on the 12 activities

Activity	Full-time Work	Part-time Work	'Non-Workers'	Overall Sample
Horse racing	7	5	3	5
Other racing	4	2	1	3
Sport	3	0	4	1
Lotto games†	41	24	31	35
Bingo games	10	13	13	12
Keno	6	6	3	5
Poker machs.	11	9	10	10
Video cards	2	1	1	1
Video keno	<1	<1	<1	<1
Cards/Dice	1	0	<1	<1
Roulette	1	0	<1	<1
Misc./Other	1	1	1	<1
Number (n)	473	206	527	1206

† statistically significant association ($p < .05$) between work status and participation level using $\chi 2$ test.

5.6.7 Participation and Frequency of Gambling in Relation to the type of Occupation (SES Measure 2)

The original occupational groups used in the survey (Appendix C) were recoded into three broad categories: white-collar (professionals, executives, sales-people, semi-professional and other white collar workers), blue-collar (skilled and unskilled workers, farm workers), and business owners (small business owners and farm owners). Statistical analysis showed that white-collar (81%) and blue-collar workers (86%) were significantly more likely to have gambled during the previous 12 months

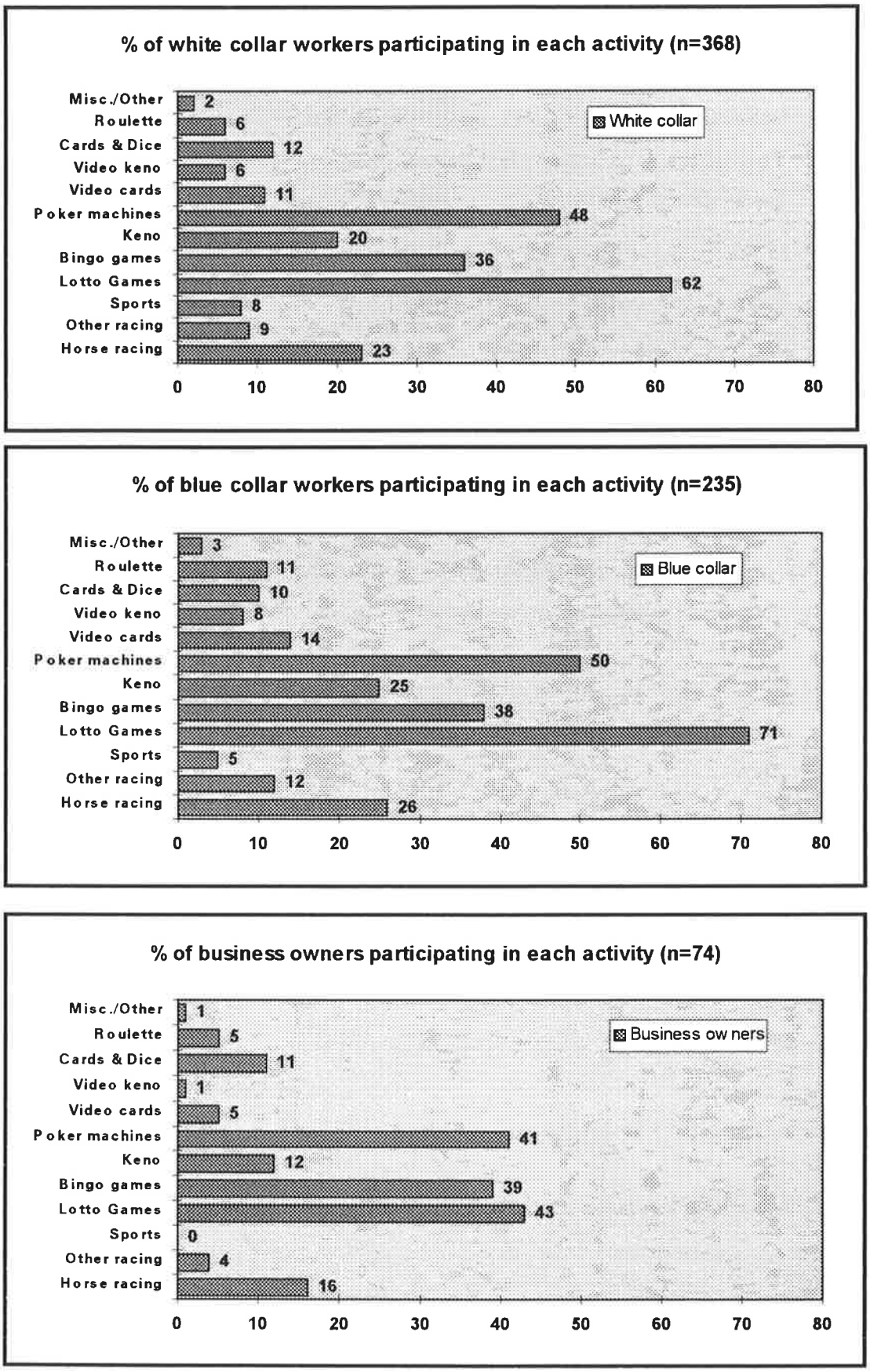


Figure 5.5: Participation in each activity in relation to type of work

compared with business or farm owners (73%), $\chi 2(2)=6.8$, $p < .05$. The percentage of people who had participated in each activity is shown in Figure 5.5.

Chi-square analyses showed that there was a significant association between a person's type of work and their participation in sports, $\chi 2(2)=13.5$, $p < .01$, lotto games, $\chi 2(2)=19.1$, $p < .01$, and keno, $\chi 2(2)=6.1$, $p < .05$. Inspection of Figure 5.5 shows that blue collar workers were more likely to have played lotto games, whereas business owners were less likely to have played them. Blue-collar workers were also significantly more likely to have played keno, horse racing and gambled on sporting activities.

The three groups were also compared in relation to the frequency with which they played each activity. The results for this analysis are displayed in Table 5.6. Table 5.6 shows that there was a significant association between occupational type and frequency of gambling on lotto games. Business owners were 16% less likely to have gambled on lotteries compared with the rest of the people in the sample.

Table 5.6: Percentage of people in each occupational group who gambled at least once per month on the 12 activities

Activity	White collar	Blue collar	Business Owners	Overall Sample
Horse racing	7	7	8	5
Other racing	4	3	4	3
Sports	2	1	0	1
Lotto games†	38	44	19	35
Bingo games	11	15	14	12
Keno	5	8	1	5
Poker machs.	11	9	4	10
Video cards	2	0	1	1
Video keno	<1	0	1	<1
Cards/Dice	1	1	<1	<1
Roulette	1	0	1	<1
Misc./Other	1	0	1	<1
Number (n)	368	235	74	1206

† statistically significant association ($p < .05$) between occupational type and frequency of gambling using $\chi 2$ test.

5.6.8 Participation Levels and Frequency of Gambling for People not Involved in and Formal/ Paid Employment

A separate series of analyses was conducted using those people (n=527) not involved in any form of paid employment. These people included those looking for work, retired people, students, people in home duties and any other people. Results showed that students were less likely to have gambled during the previous 12 months (58%) compared with: 73% of people looking for work, 74% of retired people, 79% of those in the 'other' category and 71% for people engaged in home duties. However, this difference was not significant because of the small number of students in the sample (n=36). The percentage of people who participated in each of the 12 activities is displayed in Figure 5.6.

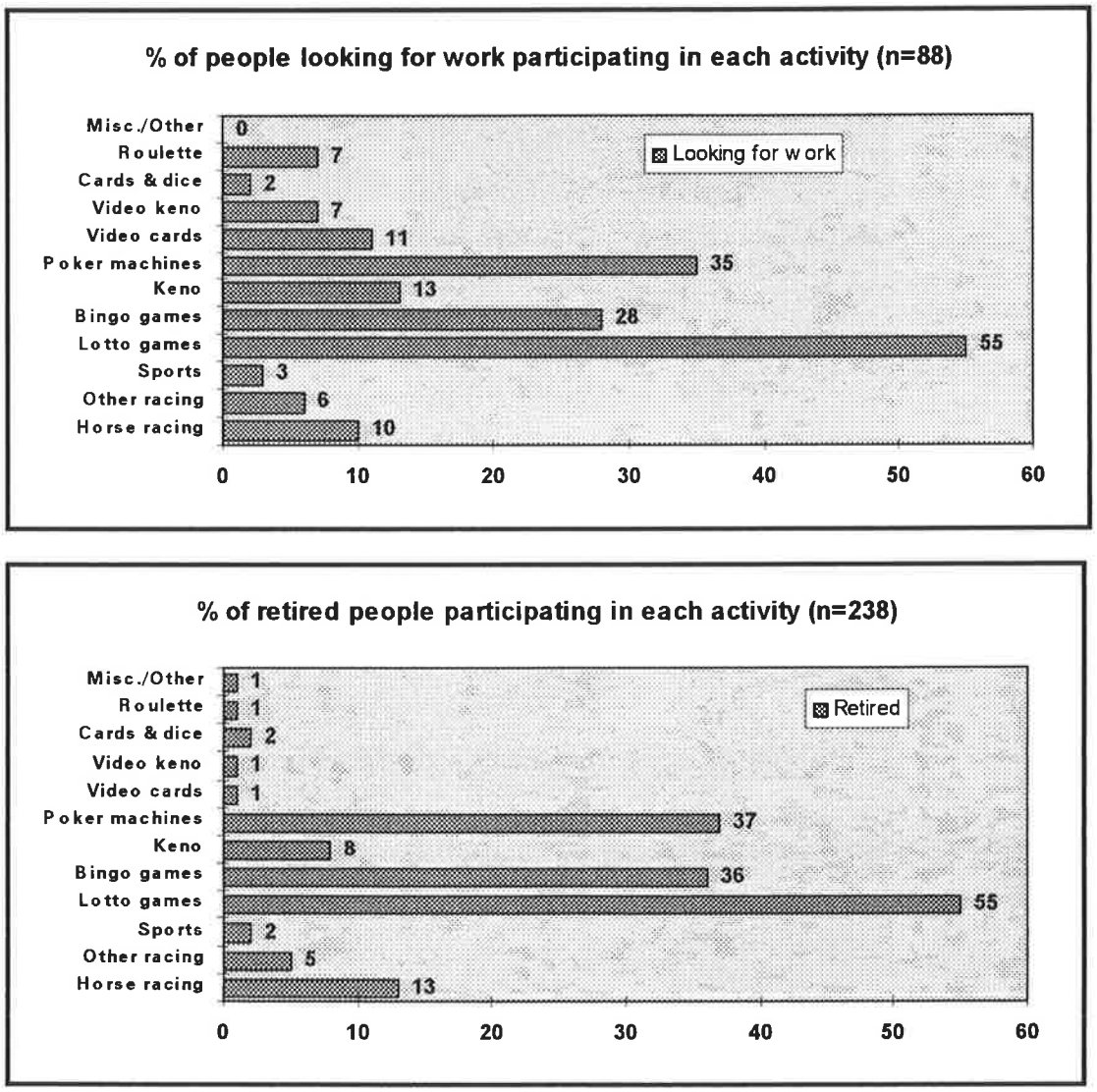
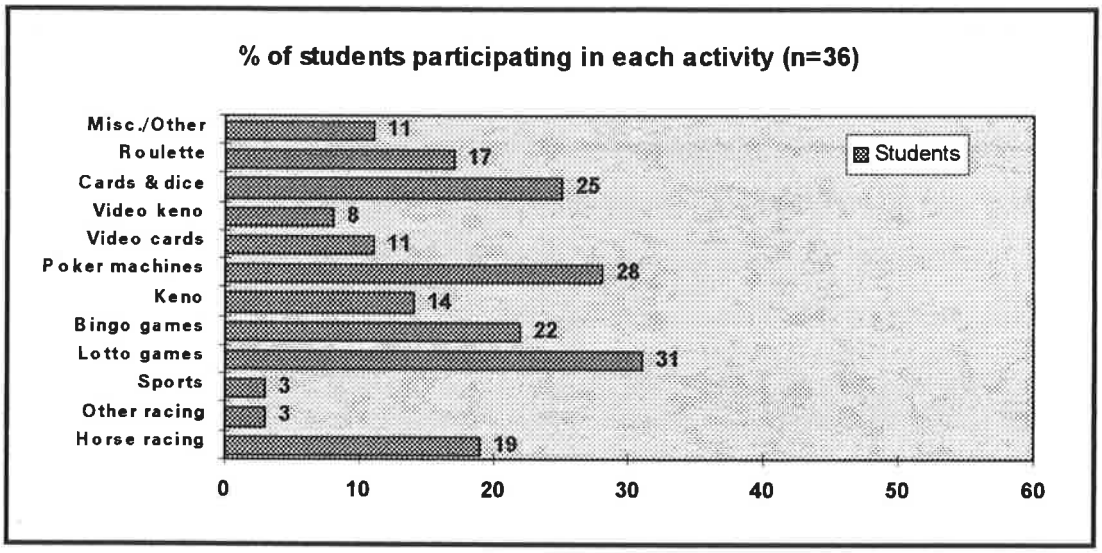
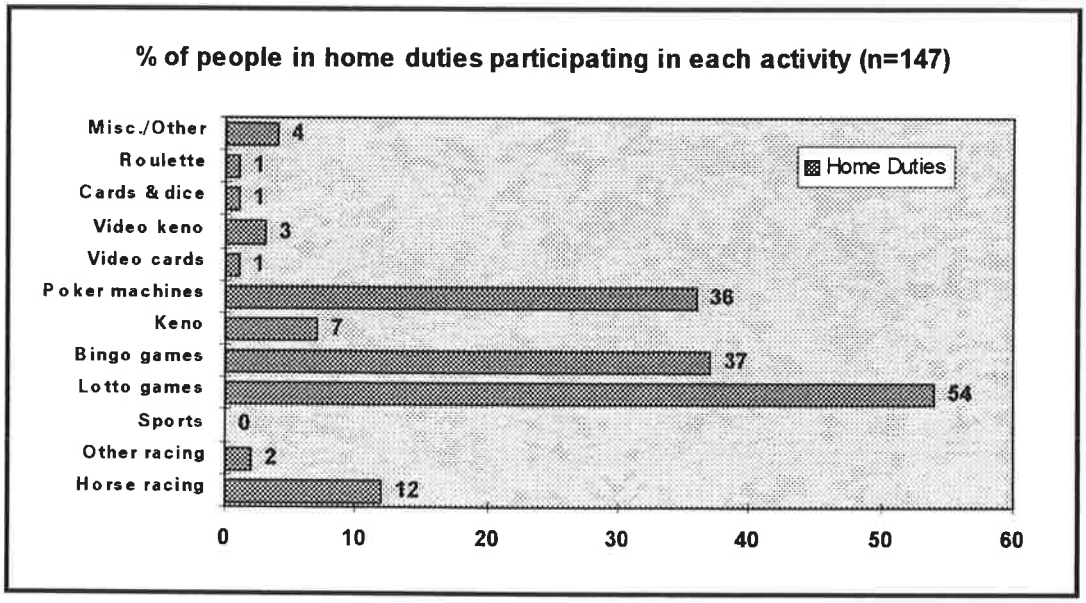


Figure 5.6: Participation in each activity in relation to 'non-worker' status.





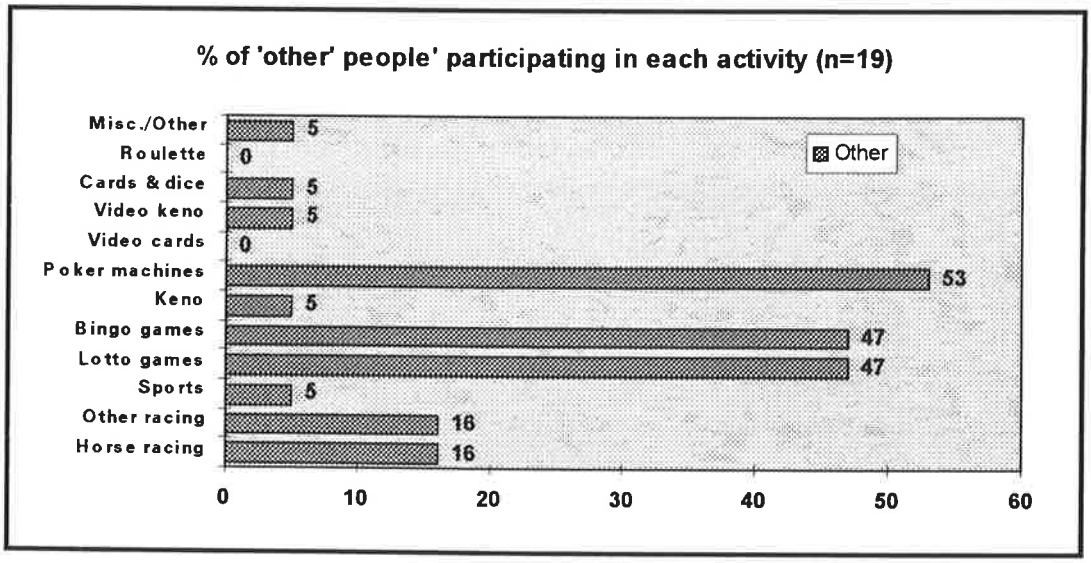


Figure 5.6 (cont.): Participation in each activity in relation to 'non-worker' status

An analysis of the results in Figure 5.6 revealed no significant associations between 'non-worker' status and participation in any of the activities. However, non-worker status was related to the frequency with which people gambled on lotteries (or lotto games) (Table 5.7), $\chi 2(5)=84.4$, $p < .01$, and poker machines, $\chi 2(5)=12.3$, $p < .05$. An inspection of Table 5.7 shows that students were less likely to have gambled frequently on lotteries compared with the other groups and the sample as a whole (-27%). Poker machines were more likely to have been played frequently by retired people and less frequently by those engaged in home duties.

Table 5.7 Percentage of people in each 'non-worker' category who gambled at least once per month on the 12 activities

Activity	Looking for work	Retired	Students	Home DutiesOther		Overall
Horse racing	2	5	0	5	5	5
Other racing	0	2	3	0	2	3
Sports	3	2	3	5	0	1
Lotto games†	26	39	8	28	32	35
Bingo games	13	15	6	10	42	12
Keno	6	3	8	5	3	5
Poker machs.†	9	15	8	4	11	10
Video cards	1	0	6	1	0	1
Video keno	1	0	0	2	5	<1
Cards/Dice	0	0	0	0	1	<1
Roulette	0	0	0	0	1	<1
Misc./Other	0	<1	0	4	5	<1
Number (n)	88	238	36	147	19	1206

† statistically significant association ($p < .05$) between 'non-worker' category and frequency of gambling using $\chi 2$ test.

5.6.9 Participation in Gambling Activities in Relation to Annual Household Income (SES Measure 3)

Six categories of household income were used. These ranged from 'less than $10,000' up to maximum of 'greater than $50,000', with categories evenly spaced in between. Chi-square analysis revealed a significant association between income level and overall participation in gambling activities, $\chi 2(5)=232.5$, $p < .01$. Gambling tended to be higher in those with higher incomes and lower in those with lower incomes. Only

74% of people with total household incomes < $10,000 had gambled compared with: 73% for people with incomes between $10,001 and $20,000, 71% for people with $20,001-30,000, 85% for people with $31,001-$40,000, 90% for people with $41,000 to $50,000 and 81% for people with incomes greater than $50,000. Similar results were obtained when these income categories were examined in relation to the percentage of people who had gambled on each activity (Figure 5.7). The significant findings are described in the dot-point summary which follows (+ and - signs once again refer to the magnitude of deviations from the sample average).

- Horse racing: (significant association between income level and participation, $\chi 2(5)=25.0$, $p < .01$). Horse racing was less likely to have attracted interest from people with incomes less than $10k (-9%), people with incomes $10k-20k (-8%), but was more likely to have attracted people with incomes $40k-50k (+11%).

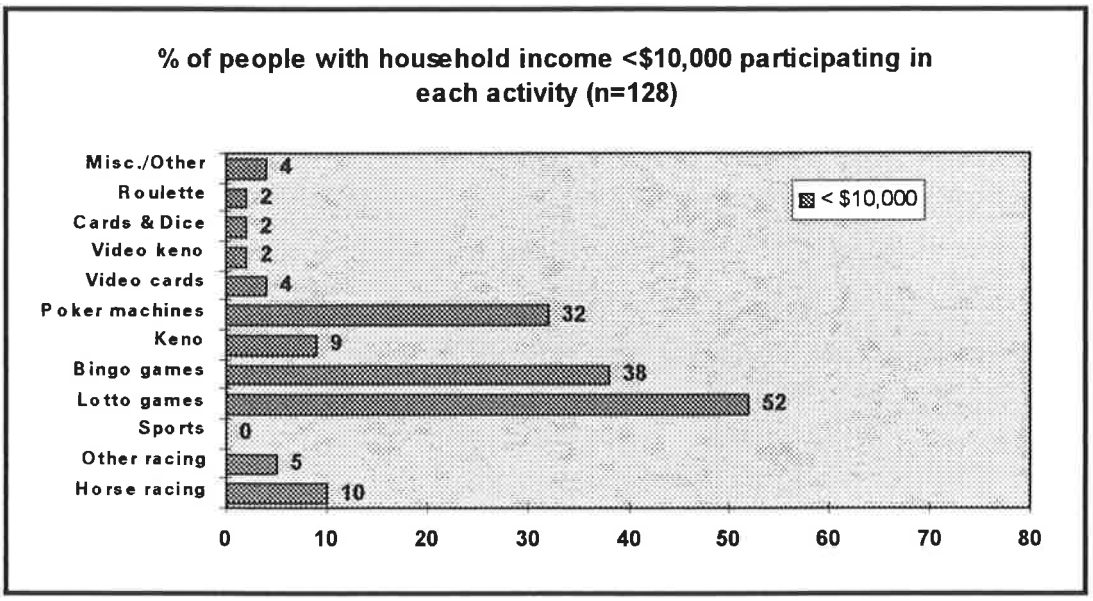
- Other racing: (significant association between income level and participation, $\chi 2\ (5)=25.3$, $p < .01$). People with incomes between $40k-50k were more likely to have gambled on this activity (+10%).

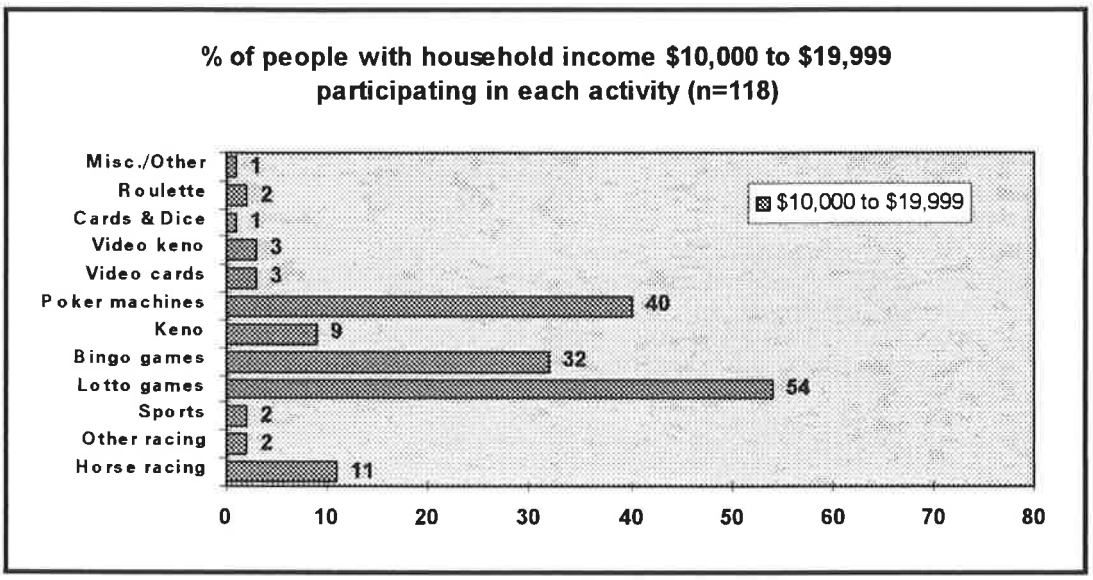
- Lotto games: (significant association between income level and participation, $\chi 2(5)=14.3$, $p < .05$) were more likely to have been played by people with incomes $30k-40k (+14%) and people with incomes $40k-50k (+8%), but were less likely to have been played by people with incomes less than $10k (-6%).

- Keno: (significant association between income level and participation, $\chi 2(5)=16.2$, $p < .05$) was more likely to have been played by people with incomes $30k-39k (+10%), but was less likely to have been played by people with incomes less than $20k (-6%).

- Poker machines: (significant association between income level and participation, $\chi 2(5)=22.9$, $p < .01$) were more likely to have been played by people with incomes $30k-39k (+8%), but less likely by people with incomes less than $10k (-10%).

- Video card games: (significant association between income level and participation, $\chi 2(5)=12.9$, $p < .05$) were more likely to have been played by people with incomes greater than $30k (+7%).





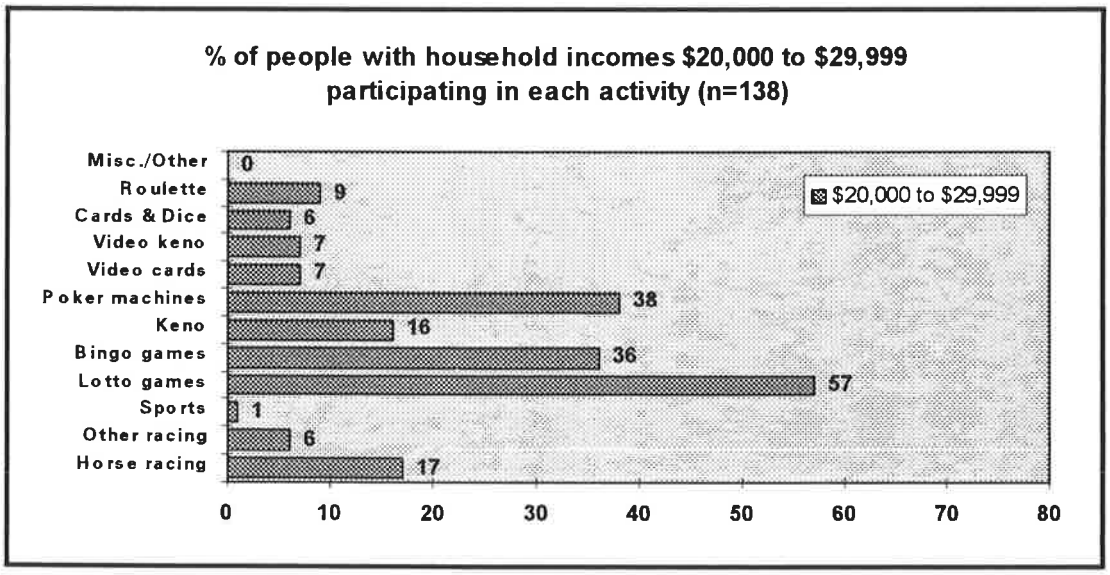
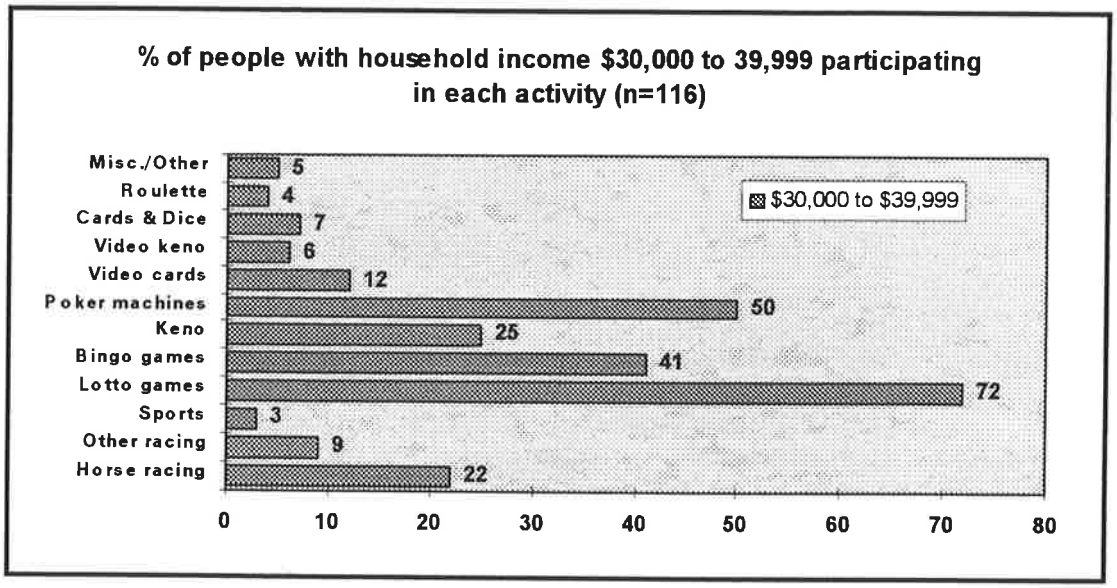
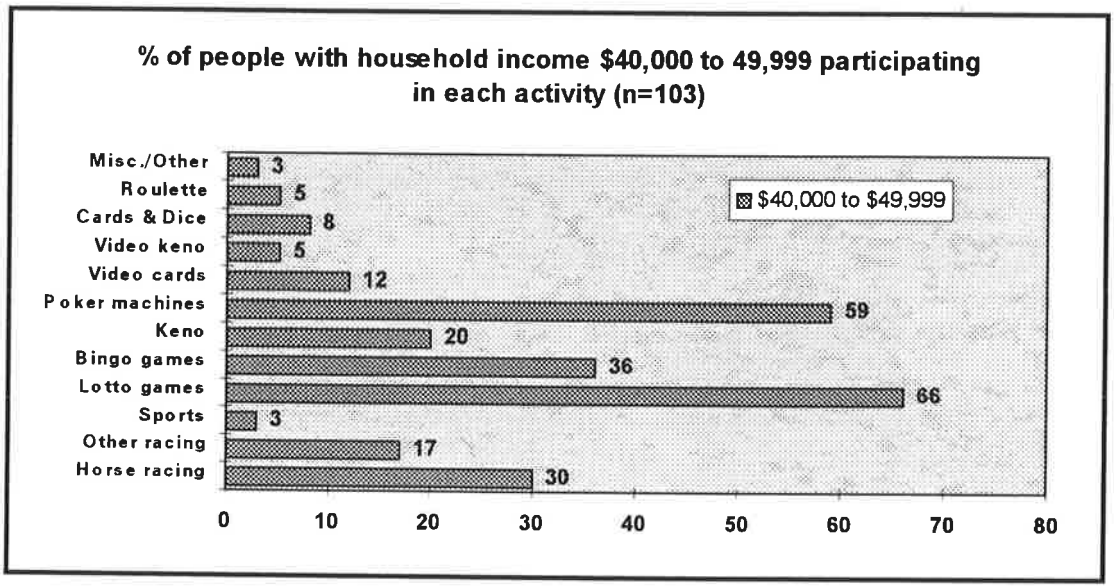


Figure 5.7: Participation in each activity in relation to household income





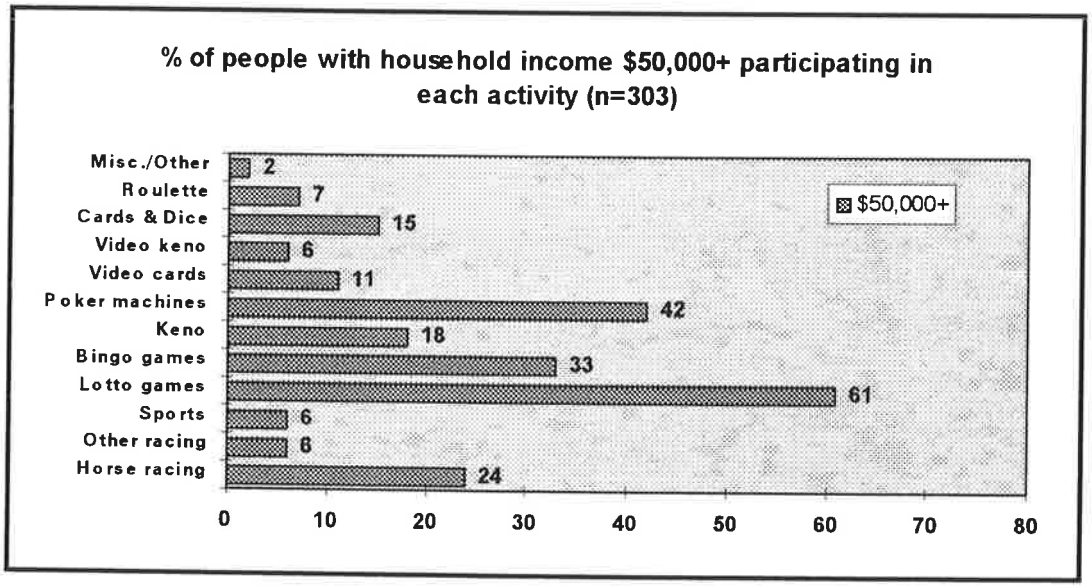


Figure 5.7: Participation in each activity in relation to household income

- Cards & Dice: (significant association between income level and participation, $\chi 2(2)=28.5$, $p < .01$). A valid comparison of all 6 categories was not possible because the minimum expected frequency of some cells was < 5. Therefore, categories were collapsed and income levels of 0-$20k were compared with those with $20k-40k and $40k+. This analysis showed that card and dice games were mostly played by people in the $40k+ income groups, but less by people with incomes less than 20k.

- Roulette: (significant association between income level and participation, $\chi 2(2)=7.2$, $p < .05$). A valid comparison of all 6 categories was not possible because the minimum expected frequency of some cells was < 5. Thus, categories were collapsed and income levels of 0-$20k were compared with those with $20k-40k and $40k+. Roulette was mostly played by people with incomes of $40k+ and less by those with incomes less than $20k.

Household income levels were also examined in relation to the percentages of people who gambled more frequently on each of the twelve activities. The results for this analysis are displayed in Table 5.8, which shows that people with household incomes $30,000 to $39,999 were significantly more likely to gamble more frequently on bingo games, $\chi 2(5)=24.5$, $p < .01$. No other significant results were obtained.

Table 5.8: Percentage of people in each 'household income' category who gambled once per month [or more often] on the 12 activities

Activity	<$10k	$10k-20k	$20k 30k	$30k-40k	$40k-50k	$50k+
Horse racing	4	3	4	7	12	5
Other racing	2	2	1	3	5	2
Sports	0	0	1	2	3	1
Lotto games	31	33	37	46	39	37
Bingo games†	16	9	12	17	15	8
Keno	2	3	4	5	9	6
Poker machs.	9	15	7	13	9	10
Video cards	2	0	1	0	1	2
Video keno	0	0	1	0	2	<1
Cards/Dice	0	0	0	0	1	1
Roulette	0	0	0	0	0	0
Misc./Other	1	1	0	3	3	<1
Number (n)	128	118	138	116	103	303

† statistically significant association ($p < .05$) between household income and frequency of gambling using $\chi 2$ test.

Summary of Results for Income

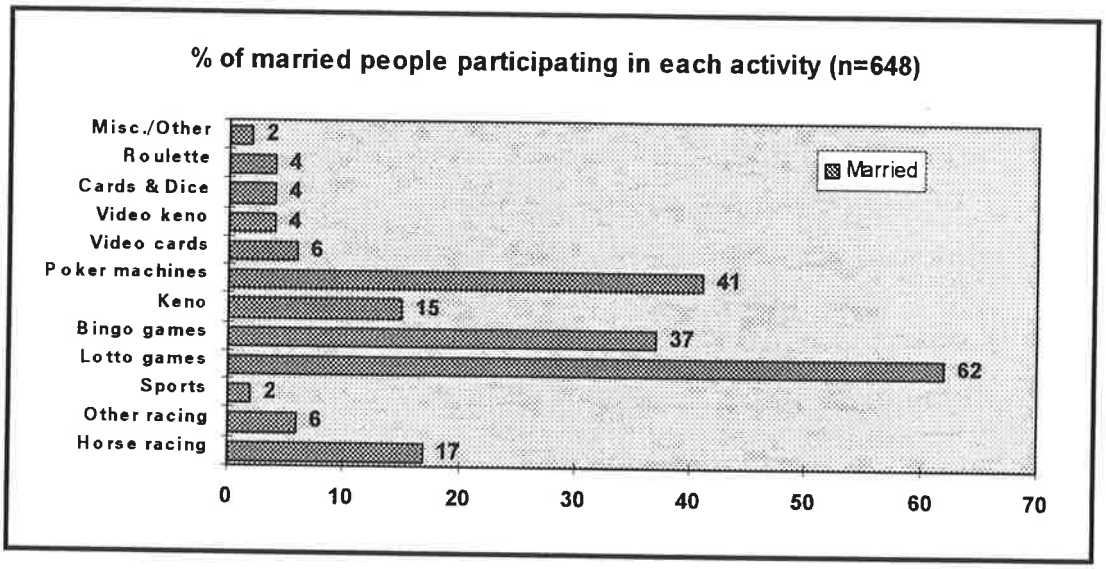
The results clearly show that gambling participation in South Australia is significantly higher in people with higher incomes and lower in those with low incomes. This pattern is consistently observed for nearly all of the individual gambling activities. Income level does not, however, influence the frequency with which people are involved in gambling (Table 5.8).

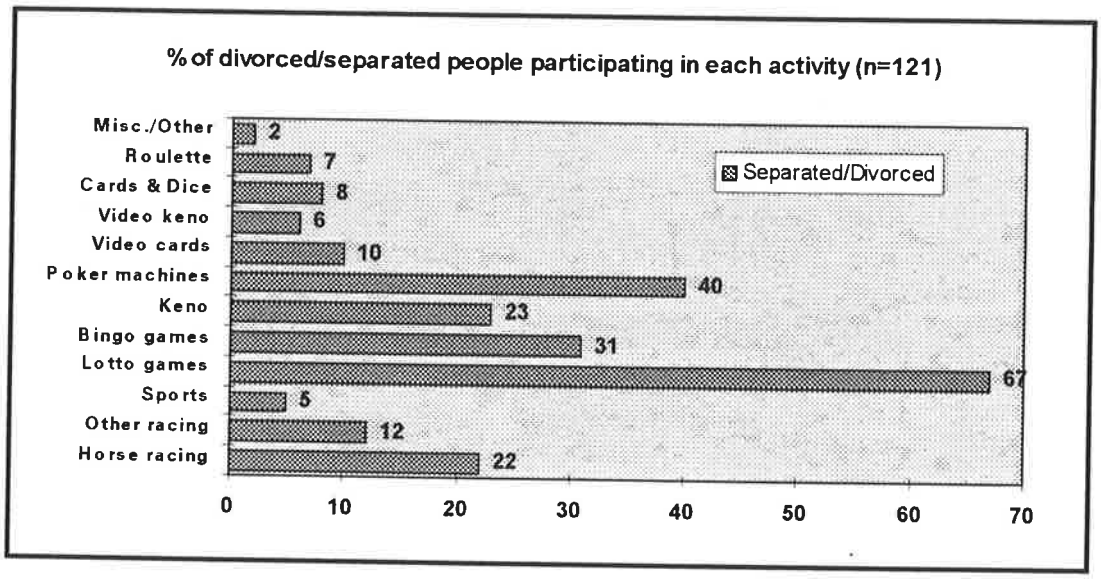
5.6.10 Participation in Gambling Activities in Relation to Personal/ Marital Status

The final demographic variables considered was marital status. This was analysed in six categories: married, divorced or separated, widowed, de facto relationship, engaged/planning to marry and single. Using these categories in chi-square analysis, a significant association was found between marital status and involvement in gambling activities, $\chi 2(5)=11.5$, $p < .05$. People who were engaged or planning to marry were more likely to have gambled at least once during the previous 12 months (90%). This figure compared with: 85% for people who were separated or divorced, 81% for people in de facto relationships, and 79% for people who were married. Lower levels of involvement were observed for widowed people (73%) and single people (74%).

Figure 5.8 shows the relationship between marital status and the percentage of people participating in each of the twelve gambling activities. Chi-square analysis of these results revealed significant results for horse racing, $\chi 2(5)=12.6$, $p <.05$, with people in de facto relationships more likely to have gambled (+9%) compared to the overall sample percentage; lotto games, $\chi 2(5)=43.7$, $p <.01$ which were more likely to have been played by divorced people (+9% vs. average), people in de facto relationships (+11%), but were less likely to have been played by single people (-15%); and keno, $\chi 2(5)=13.1$, $p <.05$, which was more likely to have been played by divorced people (+8% compared to sample average).

An analysis was also made of how marital status was related to the frequency of gambling on each activity. The results of this analysis are displayed in Table 5.9. As can be observed, very few of the percentages differed markedly from the overall sample percentages. The only significant association was found for lotto games which were played less frequently by single people, $\chi 2(5)=36.2$, $p < .01$.





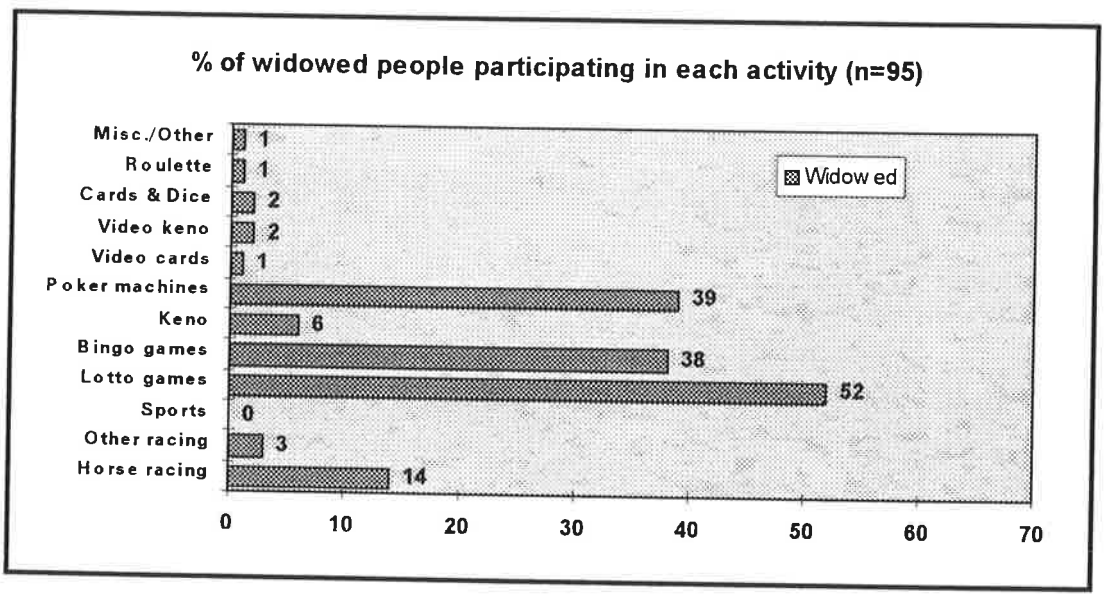
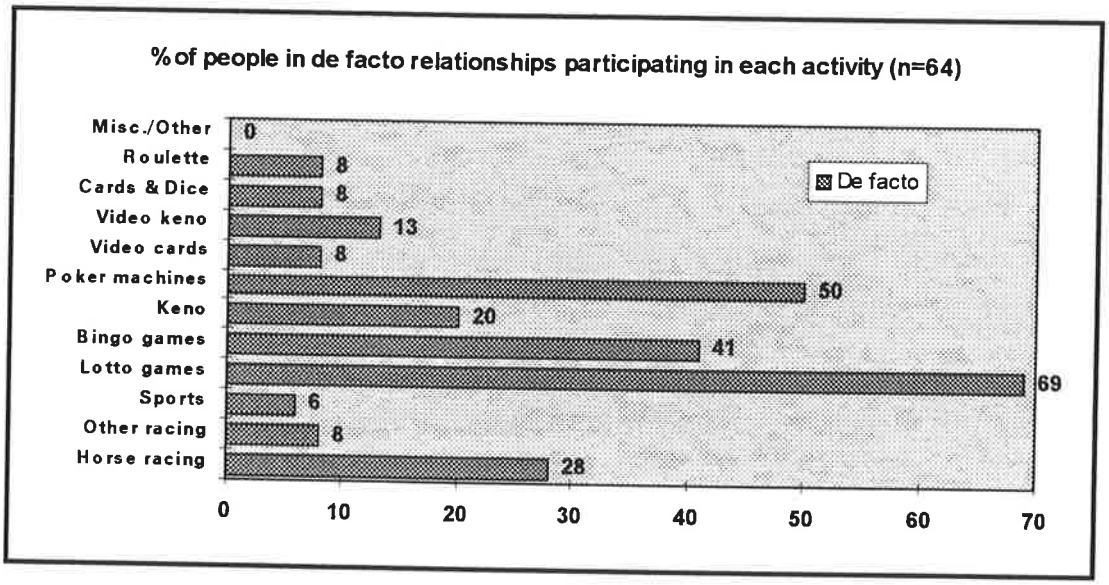
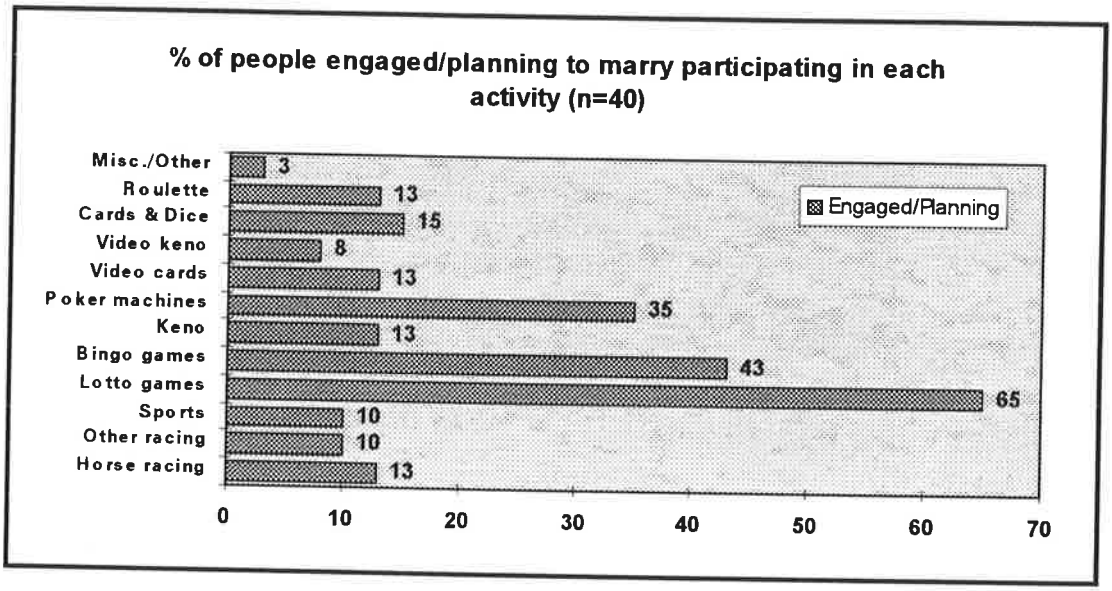


Figure 5.8: Participation in each activity in relation to marital status





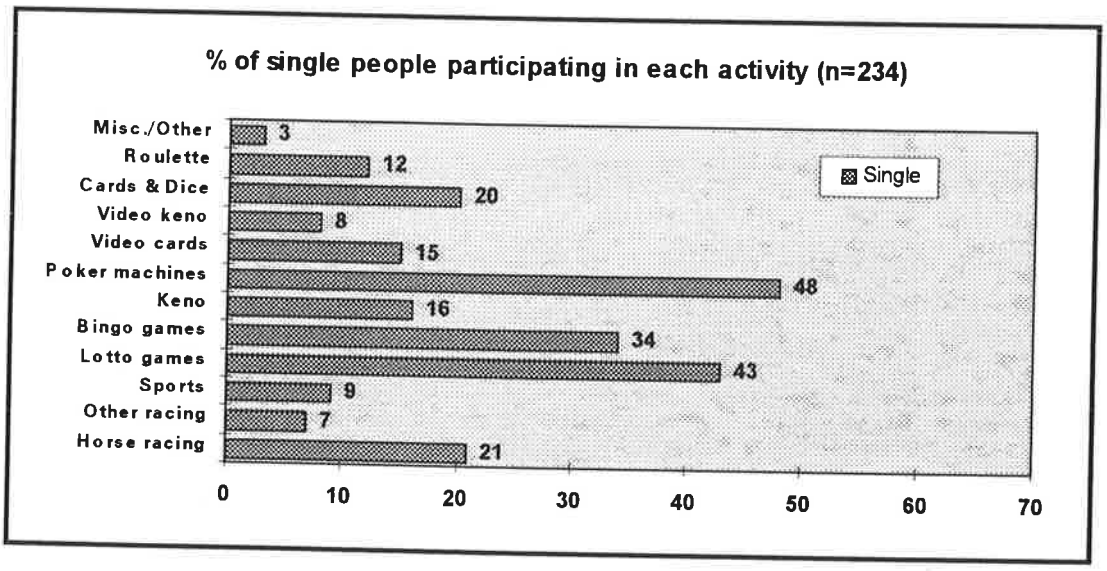


Figure 5.8 (cont.): Participation in each activity in relation to marital status

Table 5.9 Percentage of people in each 'personal status' category who gambled once per month (or more often) on the 12 activities

Activity	Married	Separated/ Divorced	Widowed	De facto	Engaged/ Planning	Single
Horse racing	5	6	3	11	5	7
Other racing	2	4	3	3	5	3
Sports	1	1	0	0	5	3
Lotto games†	40	36	32	34	38	19
Bingo games	11	11	17	9	18	12
Keno	4	7	3	9	10	6
Poker machs.	9	12	12	11	10	10
Video cards	<1	1	0	5	0	4
Video keno	<1	1	0	2	0	<1
Cards/Dice	<1	1	0	0	0	2
Roulette	<1	1	0	0	0	3
Misc./Other	1	1	0	1	0	1
Number (n)	648	121	95	64	40	234

† statistically significant association ($p < .05$) between personal status and frequency of gambling using $\chi 2$ test.

Summary of Marital Status

The results for this variable show few consistent associations between marital status and gambling involvement. Although single people were found to have a lower level of overall involvement than other groups, single people did not differ in the frequency with which they gambled.

5.7 Overall Best Predictors of Involvement in Each Activity

A limitation with the analyses described above is that some effects may be confounded or spurious because of correlations between independent variables. For example, it is possible that increased age is likely to be correlated with non-worker status and lower incomes, whereas female gender is likely to be correlated with lower incomes. In order to examine this possibility, Spearman correlation analysis for ordinal data was conducted using: the 6 age categories, worker status (recoded 1=part or full-time work, 2=not working), gender and income levels. This analysis revealed a significant positive correlation between work-status and age-group ($rho(1204)=0.39$, $p < .001$), a negative correlation between work-status and income level ($rho(908)=-0.65$,

$p < .001$), and also a negative association between female gender and income level (rho(908)= -0.38, $p < .001$). In other words, older people were less likely to be employed, or to have high incomes, whereas women tended to have lower household incomes. Therefore, it is unclear whether the effects observed individually for income level, age and gender are related to the effects of the other variables. For example, are the effects observed for lower income-levels merely related to the fact that lower income earners tend to be older? In order to address this problem, a logistic regression analysis was conducted. This analysis used the four variables listed above (gender, age, income, work status) to predict involvement in each type of gambling (0=no involvement, 1=involvement). Marital status was not included because the chi-square analysis showed few systematic associations between this variable and gambling participation.

The results of the logistic regression and shown in Table 5.10 and clearly show that, when one controls for the effect of gender, age and work-status, income level is not a significant predictor of gambling involvement. Overall, it appears that age is the most useful predictor of involvement in those activities which require knowledge or skill (e.g., sports betting, video-card games, Casino card and dice games) or in those activities which appear more complicated (e.g., video-keno or roulette). Gender is the second best predictor of involvement in five of these six activities (except video keno) and the best predictor of involvement in greyhound and harness racing. Indeed, across these six activities, an average of 91% of cases could be correctly classified using only gender and age. In all cases, the sign of the beta-coefficients show that the results were attributable to younger age groups and men (i.e., lower gender score, M=1) having a greater preference for the more complicated and/or skilful activities (see Chapter 2). By contrast, women showed a greater preference for bingo games.

Work status was related to participation in horse-racing, keno, bingo games and video-cards, suggesting that people who are employed (and presumably wealthier) are more likely to gamble on these activities than those who are not working. Indeed, this was the only variable which significantly predicted an involvement in keno and poker machine gambling. In both these activities, less than 60% of cases could be correctly classified using the four predictors selected.

Table 5.10: Logistic Regression: Demographic Predictors of Gambling Involvement

Activity	Variable	Beta	Wald†	R	Odds Ratio
Horse racing	Work Status	-0.63	7.21**	-0.07	0.53
	Gender	-0.41	5.35*	-0.06	0.66
	Age	-0.04	0.60	0.00	0.96
	Income	0.03	0.08	0.00	1.03
			(79.25% of cases correctly classified)		
Other racing	Gender	-0.99	11.18***	-0.13	0.56
	Work Status	-0.58	2.32	-0.02	0.37
	Age	0.03	0.09	0.00	1.02
	Income	0.04	0.19	0.00	1.04
			(92.23% of cases correctly classified)		
Sports Betting	Age	-0.66	17.41***	-0.20	0.62
	Gender	-1.49	10.21**	-0.15	0.22
	Income	0.23	3.41	0.06	0.51
	Work Status	-0.47	0.73	0.00	1.26
			(95.31% of cases correctly classified)		
Lotto Games	Income	0.11	3.78	0.04	0.72
	Work Status	-0.33	3.21	-0.03	0.93
	Age	0.07	2.75	0.02	1.07
	Gender	-0.07	0.26	0.00	1.12
			(59.95% of cases correctly classified)		
Bingo Games	Gender	0.41	8.15**	0.07	0.68
	Work Status	-0.38	4.05*	-0.04	1.51
	Age	0.05	1.09	0.00	1.05
	Income	-0.05	0.67	0.00	0.96
			(63.11% of cases correctly classified)		

1. † =1 degree freedom
2. * $p < .05$ **, $p < .01$, *** $p < .001$
3. Coding: Gender (M=1, F=2), Work Status (1=working, 2= not working)

Table 5.10 (cont.)

Activity	Variable	Beta	Wald†	R	Odds Ratio
Keno	Work Status	-0.96	13.78***	-0.11	0.38
	Gender	-0.19	1.06	0.00	0.82
	Income	-0.04	0.40	0.00	0.98
	Age	-0.02	0.10	0.00	0.96
			(83.08% of cases correctly classified)		
P/machines	Work Status	-0.53	8.32**	-0.07	0.59
	Age	-0.04	0.70	0.00	1.03
	Income	-0.02	0.18	0.00	0.96
	Gender	-0.03	0.04	0.00	0.98
			(58.45% of cases correctly classified)		
Video Cards	Age	-1.00	29.15***	-0.21	0.37
	Gender	-0.99	13.94***	-0.14	0.37
	Work Status	-0.99	7.90**	-0.10	0.58
	Income	-0.04	0.25	0.00	0.96
			(89.94% of cases correctly classified)		
Video Keno	Age	-0.43	12.82***	-0.16	0.65
	Work Status	-0.89	4.40*	-0.07	0.41
	Gender	-0.19	0.36	0.00	0.83
	Income	-0.02	0.02	0.00	0.98
			(94.33% of cases correctly classified)		
Cards & Dice	Age	-0.68	36.86***	-0.24	0.54
	Gender	-0.52	3.92*	-0.06	0.59
	Work Status	-0.62	3.21	-0.04	0.51
	Income	0.11	1.05	0.00	1.12
			(90.64% of cases correctly classified)		
Roulette	Age	-0.50	19.28***	-0.19	0.94
	Gender	-1.10	10.82**	-0.14	0.33
	Income	0.09	0.66	0.00	0.61
	Work Status	-0.01	0.03	0.00	1.09
			(93.67% of cases correctly classified)		

1. † =1 degree freedom
2. * $p < .05$ **, $p < .01$, *** $p < .001$
3. Coding: Gender (M=1, F=2), Work Status (1=working, 2= not working)

5.8 General Structure of the Gambling Market in South Australia

Another important question was whether participation in one type of activity would be related to participation in other similar activities. For example, if a particular person (e.g., younger male) preferred one skilled activity (e.g., horse-racing) would that person also prefer casino games? To examine this question, each person in the sample of 1206 was assigned a value of (0=not involved, 1=involved) for the eleven activities (excluding the ambiguous miscellaneous category). A correlation matrix was created (see Appendix D) and the structure of this was examined using exploratory factor analysis with Varimax (or orthogonal) rotation. This choice was based upon the theoretical discussion provided in Chapter 2 (Figure 2.1), which suggested that the gambling market would be structured in terms of two independent dimensions (high/low involvement, reinforcement frequency (continuous vs. non-continuous gambling, Dickerson, 1989; Solonsch, 1991b).

Table 5.11 Factor Analysis of Gambling Participation Scores

Variable	Factor 1 Loadings	Factor 2 Loadings	Factor 3 Loadings	Communality Scores
Horse racing	0.04	0.19	0.81 *	0.69
Other racing	0.01	0.10	0.81 *	0.67
Sports betting	0.32	-0.01	0.48	0.34
Lotto games	-0.01	0.68 *	0.13	0.48
Bingo games	-0.03	0.71 *	0.02	0.50
Keno	0.46	0.50 *	0.16	0.49
Poker machs.	0.29	0.62 *	0.09	0.47
Video cards	0.57 *	0.22	-0.01	0.37
Video Keno	0.64 *	0.27	0.02	0.48
Cards/Dice	0.77 *	-0.07	0.11	0.62
Roulette	0.70 *	-0.06	0.16	0.53
Eigenvalues	2.98	1.42	1.23	

1. *Only those loadings 0.50 or greater are deemed statistically meaningful. All loadings greater than .05 are significant because of the very large sample size.

This analysis produced a three factor structure which explained 51.1% of the total variation between participation scores. The Bartlett Test of Sphericity ($\chi 2(10)=2148.56$, $p < .001$) and the score for the Kaiser-Meyer-Olkin Test of Sampling Adequacy (0.75) showed that the sample size and the magnitude of

correlations were sufficient for the analysis. The factor solution is presented below in Table 5.11.

Table 5.11 shows that the predicted 2-dimensional structure postulated in Chapter 2 was not supported. Although activities involving greater cognitive involvement tended to cluster on the same factor, the factor solution also appears to have been strongly influenced by the geographic location of activities. For example, Factor 1, which accounted for 27% of the variance, attracted high loadings for video cards and video keno, cards and dice and roulette all of which are available at the Adelaide Casino. Factor 2, which explained 12.9% of the variance attracted higher loadings from chance activities (poker machines, lotto games, bingo games and keno), i.e., activities which require very little 'cognitive involvement', but which are most often played in suburban locations. Finally, Factor 3 (11.2% of the variance) attracted high loadings from racing activities (high cognitive involvement). There was little evidence to suggest that activities would be clustered in terms of the frequency of reinforcement. As can be observed, poker machines, a 'highly continuous' activity, loaded on the same factor as lotteries and keno which are less continuous activities.

A limitation of this analysis is that not all variables were satisfactorily explained by the factor solution. As shown by the column of communality values (note: communality refers to the sum of the squared loadings across all three factors), there were several variables for which the accepted score of 0.5 was not obtained. Since relatively little of the variability in these variables (e.g., video cards, sports-betting) was accounted for by the factor solution, these variables should be treated with considerable caution, or else ignored in the context of the overall analysis.

5.9 General Discussion

The results of this study are generally consistent with those of previous studies (e.g., Downes et al., 1976; Hraba & Lee, 1995; Kallick et al., 1979; Kallick-Kaufmann, 1979; Mok & Hraba, 1994) which have found significant gender differences in gambling involvement. Specifically, it was found that men have a greater preference for more skilful games (e.g, Casino games, racing and sports-betting) compared with women, whereas women have a greater involvement in bingo games. The results also were consistent with other recent Australian findings (e.g., Dickerson, Baron, Hong, &

Cottrell, 1996; Dickerson, Walker, & Baron, 1994; Dickerson, Baron, & O'Conner, 1994; Dickerson, Allcock, Blaszczynski, Nicholls, Williams, & Maddern, 1996) which have shown that women are just as likely to gamble as men, particularly on those activities (e.g., lotto games, poker machines) which are readily accessible and which require little previous knowledge. However, it is unclear, given the correlational nature of this study, whether these gender differences are the result of women disliking activities or venues traditionally associated with male culture, or whether this difference is associated with women disliking activities involving competition, mental concentration or skill. This is because the more skilled activities or 'traditionally masculine' activities (e.g., racing, cards games) are located at venues where most of the clientele are likely to be men. Thus, it is not possible to determine whether it is the nature of the gambling environment or the activities themselves which is the decisive factor. A similar problem is associated with the results obtained for age. Although the results confirmed Mok and Hraba's (1991) findings that gambling participation would be negatively associated with age, particularly in regard to casino games and racing, it is unclear why this relationship exists. For example, do older people avoid casino games and racing because they have different motivations for gambling (e.g., enjoyment rather than to win money), or are they reluctant to gamble on activities that require too much knowledge, skill or concentration.

The present study also investigated the relationship between gambling involvement and socio-economic status as measured by: work status, type of work, and income. Overall, the results supported the findings of Rosecrance (1986), and recent Australian findings (AGB McNair, 1992; 1995; DBM Consultants, 1995), suggesting that gambling has become increasingly associated with the middle-class. Although there were few differences between white and blue collar workers, higher income workers and full-time workers were significantly more likely to have gambled than people who were not working or who had lower incomes. In this connection, the results were inconsistent with the theory of Caldwell (1985) or Brenner and Brenner's (1987) 'financial frustration theory' described in Chapter 3. Both these authors had argued that gambling (particularly lottery gambling) was traditionally associated with the working class because gambling was a fair way to advance one's position without inciting the envy of others, and also a way of escaping the drudgery of everyday work.

The results in this study showed instead that involvement in lotteries, and gambling in general, was higher amongst people with moderate or higher incomes. People with incomes of less than $20,000 per year were less likely to gamble. For this reason, it appears that gambling involvement does not appear to be related to attitudinal differences between the classes. A better explanation is simply that people with higher incomes can better afford the expense of gambling, in much the same way as they can better afford other 'leisure activities'.

Two qualifications which should be raised, however, are as follows. The first, that although people with a higher socio-economic status had a greater overall involvement with gambling, they were no more likely to gamble frequently. For example, as can be seen from Table 5.9, there were few significant differences between income groups in relation to monthly gambling. A second point raised by the logistic regression analyses was that many of the effects observed for work-status and all of the effects for income were spurious. Lower income-levels were only associated with lower participation levels because older people and women tended to have lower incomes. When the effects of age and gender were controlled, income was no longer a predictor. For these reasons one must similarly question the validity of some recent Australian surveys, e.g., DBM Consultants (1995), which analysed the effects of income while failing to control for the effects of other demographic variables.

The logistic regression analysis shows that it is much easier to predict involvement in the less commonly played activities (e.g., Casino games and racing) than it is to predict involvement in lotteries or poker machine gambling. Gender and age alone were sufficient for correctly classifying over 90% of people involved in casino games, racing or video card games, whereas work-status was a useful predictor of involvement in chance games. This implies that if one knows that a person gambles on racing, casino games or video card games, there is a high probability that this person will be a young male rather than an older women. However, it is important to note that the reverse probability, namely, that a given male gambles on blackjack or racing (i.e., P(blackjack/male), is likely to be much smaller. This is because there are many other factors apart from age and gender which explain why a person is involved in gambling. Such factors include family background, availability of gambling products, knowledge, cultural differences, and general interest. Indeed, this problem is reflected in Table 5.10

by the relatively small R-values obtained for each analysis, suggesting that very little of the variation in gambling preferences (i.e., play/don't play) can be accounted for by the variables. The results suggest that demographic factors are much more useful in understanding the nature of those who are *already* gambling, rather than the gambling habits of the population as a whole.

The results also showed that the gambling market in South Australia does not appear to be structured according to the two dimensions hypothesised by Solonsch (1991b): high/ low involvement and high/low frequency of reinforcement. For example, activities with a short interval between wager and outcome (e.g., poker machines) loaded on the same factor as lotteries which have the largest interval between wager and outcome. However, there was some evidence to suggest that the level of involvement is important. All four activities which loaded highly on Factor 1 ('Casino' factor) and 3 ('Racing' Factor) were classified in Figure 2.1 (Chapter 2) as 'Moderate to High Involvement' activities, whereas those which loaded on Factor 2 ('Chance' factor) were, with the exception of poker machines, described as 'Low Involvement' activities.

The question which remains, however, is whether these clusters are based upon similarities in physical, emotional or cognitive involvement (Solonsch, 1991b). Inspection of Table 5.11 suggests that it is the latter which appears to be important. Most of the activities in Factor 1 and 3, e.g., card and dice games, and racing, require greater concentration than poker machines, lotteries, keno or bingo, and, as Chantal and Vallerand (1996) have recently suggested, this may influence the type of gambler who participates. Those who treat gambling as a challenge (intrinsic motivation) will choose more complex activities, whereas those who gamble only to make money or to relax (extrinsic motivation) will gamble on less complex activities. The results presented in Table 5.10 suggest that both gender and age strongly influence this pattern of preferences, with younger males more likely to gamble on those activities in Factor 1, and males (but not necessarily younger males) more likely to gamble on activities loading highly on Factor 3. Accordingly, an important aim of a second survey conducted in this project was to follow up these findings by considering the motivational differences underlying these age and gender differences. The design and results of this second survey are presented in Chapter 7.

Chapter 6

Study 2: Social and Economic Effects of Gambling in South Australia

6.1 Overview

This aim of this chapter is to consider the relationship between demographic variables, type of gambling activities, gambling-related problems and gambling expenditure. Based upon previous research discussed in Chapter 3 and 5, this chapter examined several important questions relating to the social and economic effects of gambling: first, whether certain activities attract a greater expenditure than others; second, whether certain demographic groups spend more on gambling than others; third, the relationship between gambling problems and demographic characteristics and types of gambling; and fourth, the prevalence of problem gambling in South Australia and how it compares with other Australian States.

6.2 Estimates of Gambling Expenditure

In order to estimate the typical amount of money which South Australian gamblers spend per week on gambling, three weekly expenditure estimates were obtained: (1). A perceived estimate, (2). A calculated estimate, and (3). A net estimate. The first two of these estimates (the perceived and calculated estimates) were designed to measure the amount which people typically 'risked' or outlayed each week on gambling. The perceived estimate was obtained by asking people to estimate the amount which they typically 'took along' to spend each week on gambling, irrespective of the type of activity. The 'net' estimate was designed to estimate the amount which people believed they were losing on gambling each week, as distinct from the amount taken along to gamble. People were asked to say how much of the money they outlayed each week they typically 'got to keep' after considering the amount they typically lost or won. This amount was subtracted from the 'perceived amount' spent per week to provide a 'net figure'.

The calculated estimate was obtained by combining the information obtained in the frequency of gambling questions with the expenditure estimates reported for individual activities. This third estimate was included because many respondents who gambled less frequently than once per week found it difficult to provide a meaningful 'weekly figure', and instead gave 'zero' responses, even though they had said that they spent money on individual gambling activities. The calculated estimate was obtained using the series of computational steps described below.

(1). Frequency of play estimates on each activity (e.g., 1/month) were used to estimate the total number of sessions per year (i.e., 12 times for keno).
(2). The estimated number of occasions per year was multiplied by the amount the person typically spent each time he or she played keno (e.g., $10) to provide an annual total for the activity (i.e., $10 x 12 =$120).
(3). This analysis was repeated for all activities on which the person gambled.
(4). The year totals for all activities (e.g., $120 for keno) were totalled to provide an estimate of the total amount spent per year on gambling.
(5). This total was then divided by 52 to provide a weekly estimate.

If the frequency of gambling for individual activities was expressed as a range, the total number of sessions per year was estimated by taking an average based upon the upper and lower limits of the interval. For example, if a person gambled 2-3 times per month on a particular activity, it was uncertain whether this represented 2 x 12=24 sessions per year or 3 x 12 = 36 sessions, or some figure in between. Therefore, an average figure was used (i.e., 24 + 36/ 2= 30) which may have been higher or lower than the actual number of times the person played.

6.3 Total Amount Spent on Gambling Activities per Week (and per year)

Table 6.1 provides a summary of the three different expenditure estimates. The top figure represents the mean (median) amount which gamblers 'perceived' themselves to be spending per week on gambling activities. The middle figure is the 'calculated amount based upon the multiplication of the total number of sessions of gambling by the estimated expenditure per session. The bottom figure is the estimate of the net

amount lost. For convenience, all three figures are presented as both weekly and annual estimates (i.e, weekly figures/ 52).

As can be seen from the discrepancies between the amount per week (perceived) and the amount per week (calculated), people appear to be unaware of the full amount they spend on gambling each year. week. South Australian gamblers had a perceived weekly outlay of $13.18 per week (mean annual total=$685), but claim to have lost only an average of $7.95 per week (mean annual amount lost=$413). However, the calculated estimate suggested that actual expenditure was a lot higher with South Australians gamblers having spent a mean of $19.36 per week (i.e., a total of $1007 per year).

Table 6.1: Mean [median] total amount outlayed per week and year on gambling activities [base= people who gambled].

	Amount per week $		Total/ year $
Perceived amount (n=936)	13.18 (5.0)	(x 52) =	685(260)
Calculated amount (n=941)	19.36 (4.0)	(x 52) =	1007(208)
Net Amount (n=587)	7.95 (6.0)	(x 52) =	413(312)

Note: The number of valid cases is reduced for the net estimate because many respondents found this question too difficult to answer.

6.4 Levels of Expenditure on each of the Twelve Gambling Activities

In order to reveal the composition of the estimates provided in the previous table, the scores were broken down into a number of categories of expenditure. The results of this analysis are provided in Table 6.2 which shows that the distribution of percentages is similar for both estimates. Approximately 40% of people in the sample spent very little on gambling activities, perhaps only a single lottery ticket per week, so that their total expenditure was no more than $100 per year. However, as can also be seen, 6-7% of people spent more than $2000 per year, at an average of a little under $40 per week. In addition, 2-3% of people spent more than $5000 per year with at least 0.5% -0.6% having an estimated expenditure of over $20,000 per year. If such figure was extrapolated to the general South Australian population aged over 18, this

would mean suggest that at least 4400 South Australians are spending more than $20,000 per year on gambling.

Table 6.2: Percentage of gamblers in each annual expenditure category

	Perceived Total per Year %	Calculated Total per Year %	Net Total per Year %
Profit	n/a	n/a	2
$0-100	37	40	17
101-200	7	10	12
201-500	24	19	34
501-1000	16	16	25
1001-2000	10	8	10
2001-5000	4	5	4
5001-10000	1	1	1
10001-20000	0.6	0.8	0.2
20001+	0.3	0.8	0.0

Base: total gamblers, n=948

6.5 Amount Spent on each Gambling Activity (per session)

Figure 6.1 shows the mean (and median) amount which South Australian gamblers estimated that they spent each time they gambled on the twelve activities. From Figure 6.1, it can be observed that people spent most on casino games such as cards and dice ($49) and roulette ($36). People typically spent $25 on sports and racing activities and $14 per session on poker-machines, with lottery and bingo games usually involving an outlay of less than $10.

6.6 Demographic Differences in Gambling Expenditure

Weekly expenditure estimates and per session expenditures were examined in relation to gender, age, socio-economic status and marital status. Gender comparisons were undertaken using independent sample t-tests. The other group comparisons were undertaken using one-way ANOVA with significant overall F-values followed up with Fisher Least Significant Difference (LSD) tests. Although more conservative tests are available, this post-hoc test was deemed appropriate given the exploratory nature of the research. The mean weekly expenditure figures are presented in Table 6.3.

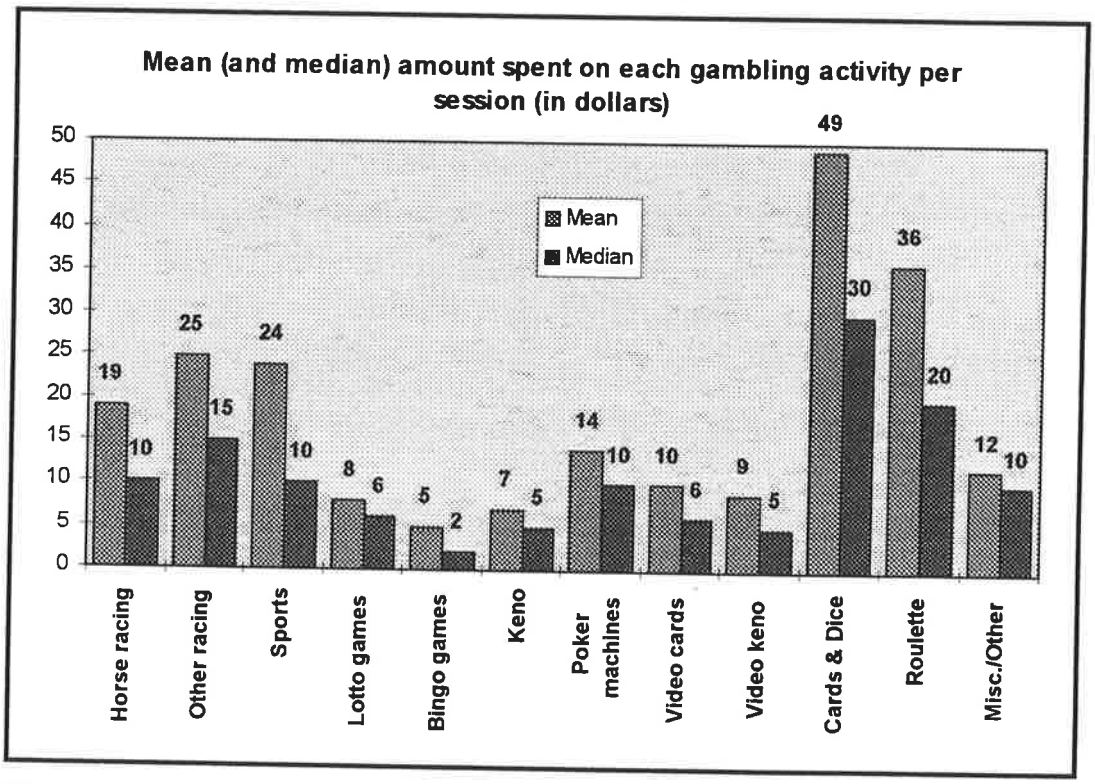


Figure 6.1: Mean [median] amount of money spent on each activity per session

Table 6.3 shows that weekly gambling expenditure was generally unrelated to specific demographic characteristics. The only significant differences were for gender and marital status. Men reported having spent significantly more than women in terms of both the perceived, $t(544)=2.54$, $p<.01$, and calculated estimates, $t(549)=3.07$, $p < .01$. The overall differences observed for marital status in relation to the perceived estimate, $F(5, 928)=3.08$, $p < .01$, and calculated estimates, $F(5,932)=3.50$, $p < .01$, were followed up using Fisher LSD tests. These revealed that divorced/separated people spent significantly more on both estimates ($p < .05$). People in de facto relationships and single people spent significantly more than married people in terms of the calculated estimate ($p < .05$).

A second series of analyses was undertaken to examine whether demographic characteristics influenced the typical amount which people spent each time they gambled on each activity. No significant differences were found. As with the weekly estimates provided in Table 6.3, this lack of significant differences is partly related to considerable variability in the scores. In several cases, the standard deviation was three or more times larger than the mean.

Table 6.3: Demographic Differences in Mean (s.d.) Weekly Expenditure

	Perceived Estimate $	Calculated Estimate $	Net Estimate $
Overall	13.18 (75.04)	19.36(105.3)	7.95 (52.60)
Gender			
Male	18.10 (99.08)	27.60(138.7)	6.40 (68.01)
Female	8.20 (27.47) †	10.9 (38.4) †	9.70 (25.27)
Age-group			
18-24 yrs.	13.49 (31.1)	21.77 (41.1)	12.77 (21.1)
25-34	14.62 (54.8)	18.11 (67.2)	2.88 (107.1)
35-44	16.15(104.1)	18.87(102.3)	8.81 (17.7)
45-54	14.47 (39.5)	30.00(122.5)	8.16 (8.6)
55-64	9.67 (17.6)	15.48 (34.4)	8.16 (8.7)
65+	7.74 (21.1)	11.66 (28.9)	8.64 (25.9)
Work Status			
Full-time Work	15.24 (46.9)	26.36 (99.6)	5.64 (73.9)
Part-time Work	7.96 (15.1)	10.38 (25.9)	9.12 (12.7)
Not Working	13.20 (80.8)	15.76 (82.7)	10.09 (26.9)
Type of Work			
White Collar	12.40 (35.2)	23.40(102.0)	9.90 (16.7)
Blue Collar	12.14 (18.3)	20.97 (60.4)	1.03(100.9)
Not Working	21.26 (94.6)	15.80 (64.3)	10.08 (28.8)
'Non-Workers'			
Looking for Work	8.98 (18.8)	8.30 (19.8)	12.24 (18.2)
Retired	8.70 (20.7)	12.79 (27.6)	9.10 (23.9)
Students	10.73 (15.4)	9.83 (11.7)	13.48 (17.5)
Home Duties	9.97 (34.2)	11.90 (45.6)	11.20 (36.8)
Others	113.40(394.2)	121.10(388.5)	1.24 (21.1)
Household Income			
$10k. <	10.12 (26.3)	11.51 (32.6)	11.00 (31.3)
$10kk to $20k.	7.90 (14.4)	11.28 (26.6)	7.94 (13.9)
$20kk to $30k.	10.49 (16.0)	22.79 (76.9)	-9.18(137.2)
$30k. to $40k.	11.02 (23.1)	18.27 (80.6)	8.03 (10.1)
$40k. to $50k.	13.26 (28.1)	22.84 (55.6)	13.42 (19.4)
$50k.+	13.60 (49.8)	20.02 (69.9)	10.75 (20.3)
Marital Status			
Married	7.35 (10.7)	10.40 (17.0)	7.39 (9.9)
Separated/Divorced	28.90(155.9)	38.11(190.0)	8.97 (23.8)
Widowed	10.36 (33.4)	16.17 (40.7)	11.49 (39.6)
De Facto	19.43 (41.8)	42.78(131.2)	20.39 (28.7)
Engaged/Planning	9.52 (15.7)	14.33 (26.6)	7.78 (13.1)
Single	20.87 (63.0) †	29.50 (99.6) †	4.60(113.9)

† Significant Difference ($p < .05$) using an unrelated samples t-test or one-way ANOVA.

6.7 Discussion: Gambling Expenditure in South Australia

The results show that South Australians spend a considerable amount on gambling each year. Based upon the calculated estimate (Table 6.1), it is estimated that South Australian gamblers spent over a thousand dollars per year on gambling. If this figure is extrapolated to the general population, this means that each person aged over 18 (1.2 million, Australian Bureau of Statistics, 1995) spent $785 in the financial year ending June 30th 1996. This represents a total expenditure of $940m.. It is unclear, however, whether this figure represents gross expenditure (i.e., amount taken along to gamble, but not necessarily lost) or net expenditure (amount actually lost). Although the 'net expenditure estimate' was designed to assess how much people believed they were losing, the fact that only 587 out of the total of 941 gamblers in the survey responded to this question (see Table 6.1), makes it an unreliable basis for estimation.

The same problem, of course, is inherent in both the calculated and perceived estimates. Both of these are highly sensitive to response biases. Gamblers either consistently understate the amount they spend on gambling (Lesieur, 1984; Walker, 1992a), or else overstate the amount (Walker, 1996). As Delfabbro (1996) and Walker (1996) have pointed out, two or three outliers in the expenditure figures (e.g., a person who says they spent $60,000+ per year) may be sufficient for the figures to be completely distorted and unsuitable for drawing conclusions about the population. As a result, it is suggested that total gambling expenditure cannot, and should not be, estimated from survey data. Instead, it is more appropriate to obtain expenditure estimates from the gambling industry itself. In Australia, such records are kept by the Treasury Departments of each State and tabulated each by the Tasmanian Gaming Commission. According to these authorities, South Australians lost approximately $500 per capita in the period July 1st 1995 to June 30th 1997. However, as they also point out, it is difficult to assess accurately how much money was outlayed in the process of incurring these losses.[1]

Nevertheless, a useful aspect of this survey is that it allows one to obtain an approximate understanding of South Australian spending patterns. The results show

[1] The State Treasury maintains 'Gross-turnover' figures, but these are difficult to interpret. Poker machine expenditure (the largest component of expenditure) is assessed in terms of the number of button presses on the machines. A person who takes along $5 and plays a 5c machine for 200 turns would be classed as having spent 300 x 5c=$15 rather than the $5 'brought' to the venue.

that most South Australian gamblers spend only a small amount on gambling. Table 6.2 shows that 84% spend less than $1000 per year (or less than $20 per week), with less than 2% spending more than $5000 per year. In addition, it was found that the amount people spend differs depending upon the type of gambling involved. Visits to the Casino were associated with expenditures of $40-50, racing and sports betting typically involved expenditures of $20-$25, whereas lotteries, keno and gaming machines typically involved less than $20. In other words, the fact that poker machine gambling is the biggest gambling industry in the State, does not imply that it is also the most expensive. Indeed, because the minimum bet is 5c on many machines compared with $2-$5 for casino games, people generally spend less per occasion when they play poker machines. However, their annual expenditure on poker machines is higher because of the frequency with which they play.

The third finding in this study was that gambling expenditure is overall unrelated to demographic characteristics. Only gender and marital status were found to influence weekly gambling expenditure. Consistent with Hraba and Lee (1995), Mark and Lesieur (1992), and Kallick-Kaufmann (1979) men were found to spent more than women, whereas married people typically spent less than those who were not in a stable relationship. This is consistent with the idea that women or married people tend to have less disposable income to spend on gambling. It is also consistent with the findings in Chapter 5, which showed that that women tend to avoid the more expensive types of gambling, e.g., casino games and racing. Finally, the fact that gambling expenditure is unrelated to socio-economic class is consistent with previous studies (e.g., Mobilia, 1992) which have drawn attention to the 'regressive' nature of gambling. Since people with lower incomes or without employment spend a similar amount on gambling to those with higher incomes and who are working, it follows that the former is spending a greater percentage of disposable income on gambling than the latter.

6.8 Gambling-related Problems in South Australia

As noted in Section 5.3 (Chapter 5), the incidence of gambling problems was assessed using Lesieur and Blume's (1987) South Oaks Screen (SOGS) and a series of other questions relating to the psychological, social, economic (PSE) effects of

gambling. This latter series of question was adopted from previous studies conducted by the Australian Institute for Gambling Research (Dickerson et al., 1994; Dickerson et al., 1995) and the DSM IV. The percentage of regular gamblers who endorsed each of the twenty items in the SOGS is displayed in Table 6.4 (NB. The scoring key for the SOGS is contained in Appendix D).

The figures in the first column of Table 6.4 refer to the percentage of the 381 regular (once/week or more) gamblers who endorsed each of the twenty items in the SOGS. As can be seen, the most frequently endorsed items were Q1 (15%) which referred to whether a person had chased losses during the previous 6 months. The second highest percentage was for Q4, which showed that 14% of the regular gamblers in the survey had gambled 'more than they had intended' on, at least, some occasions. The next highest percentages were 7.6% for Q6 (felt guilty about gambling) and 7.1% for Q5 (criticised for gambling). Very few people indicated that they had had arguments relating to gambling, had lost time from work or study, or that they presently had a problem with gambling. In fact, if one considers the percentage who responded that they had a gambling problem at the time of the survey (Q3), the percentage is only 0.6% of the 381 regular gamblers. Eighty five percent of people who responded 'yes to question 2 said that they had experienced a gambling problem 'in the past, but not now'). The figures for the second part of the SOGS questions relating to the borrowing of money to finance gambling or gambling-related debts were also low. Overall, only 8.8% of the regular gamblers reported having borrowed money to gamble, with the most common source of money being household savings (3.4%), credit cards (2.6%) and relatives or in-laws (2.1%).

Although most of the percentages do not appear to be very large, the figures become more meaningful when one considers the absolute number of cases in South Australia which each represents. If one considers that the population of South Australia (18 years and over) is approximately 1.12 million (ABS, 1995), relatively small percentages will correspond to a substantial number of people. A figure of 2%, for example, would represent approximately 22,000 people. Thus, if one considers some of the more important items in Table 6.4, one can infer that approximately 14,000 people in South Australia have experienced a gambling problem at some time during

Table 6.4: Percentage of people who scored on each of the 20 SOGS items

Question	% Regular Gamblers (n=381)	Number of Cases	Estimated Number of People in S.A. (to nearest 500)
(1). When you gamble, do you go back another day to win back money you lost?	15.5	59	55,000
(2). Have you ever claimed to be winning money when you were not?	4.2	16	15,000
(3). Have you ever felt you might have a problem with gambling?	3.9	15	14,000
(4). Have you ever gambled more than you intended?	13.9	53	49,000
(5). Has your gambling ever been criticised?	7.1	27	25,000
(6). Have you felt guilty about your gambling?	7.6	29	27,000
(7). Have you felt that you would like to stop gambling, but did not think you could?	2.4	9	8500
(8). Have you hidden signs of your gambling from your partner, or family?	0.5	2	2000
(9). Have you ever had money arguments related to gambling?	1.6	6	5500
(10). Have you borrowed money to gamble and not paid it back?	0.8	3	3000
(11). Have you lost time from work or study because of gambling?	0.3	1	1000
(12). Have you borrowed from household money?	3.4	13	12000
(13). Have you borrowed from your spouse or partner?	1.8	7	6500
(14). Have you borrowed from relatives or in-laws?	2.1	8	7500
(15). Have you borrowed from banks, co-ops etc.?	1.3	5	4500

Table 6.4 [continued]

Question	% Regular Gamblers (n=381)	Number of Cases	Estimated Number of People in S.A. (to nearest 500)
(16). Have you borrowed from credit cards?	2.6	10	9500
(17). Have you borrowed from high interest rate money lenders (loan sharks)?	0.0	0	0
(18). Have you cashed in bonds or securities?	0.8	3	3000
(19). Have you sold personal property or pawned goods?	0.5	2	2000
(20). Have you written bad cheques?	0.3	1	1000

The figures in final column are derived from dividing the number of cases by 1206 and then multiplying by the approximate number of people aged over 18 in S.A. =approx. 1.12 million.

their lifetime. Furthermore, 12,000 have borrowed from household money during the last 6 months. The results also show that an estimated 49,000 of South Australians gambled more than they had intended on some occasions during the previous 6 months and that 8500 found it difficult to stop gambling.

A second analysis was conducted to consider the percentage of people endorsing the PSE questions. The results are presented in Table 6.5. Table 6.5 shows that there was a very low incidence of serious gambling-related problems in this sample. Very few people indicated that gambling had affected their relationships, their ability to tend to their family, or their employment. However, many people said that they had, on some occasions during the previous months, gambled more than they could afford (approximately 31,500 people) and experienced depression in relation to their gambling (approximately 15,000 people).

Table 6.5 General problems associated with gambling [all questions refer to the previous 6 months]

Question	% Regular gamblers (n=381)	Number of Cases	Estimated Number of People in S.A. (Nearest 500)
1. Have you borrowed money to gamble or pay gambling debts?	3.4	13	12,000
2. Have you suffered from depression in in relation to gambling?	4.2	16	15,000
3. Has gambling left you with not enough time to look after your family's interests	0.8	3	3000
4. Have you ever gambled more than you could afford?	8.9	34	31,500
5. Has gambling damaged an important relationship in your life?	0.8	3	3000
6. Do you presently owe money because of gambling?	1.3	5	4500
7. Have you lost a job because of gambling?	0.5	2	2000
8. Have you thought about committing a crime to finance your gambling?	0.3	1	1000

6.9.1 Gambling Problems in Relation to Type of Gambling

A limitation of the figures above is that they do not provide any information about the type of gambling which is associated with the problems. Thus, in order to address this issue, a separate analysis was undertaken. This analysis focused specifically upon those people who gambled regularly (once per week) upon three broad classes of gambling: (a). Number Games: lotteries, bingo and keno, (b). Racing: horse racing, greyhounds, trotting, (c). Poker machines. (NB. It was not possible to analyse casino games because only one person in the survey gambled at least once per week on these activities). The number and percentage of people in each of these groups who endorsed each SOGS item or PSE question is displayed in Table 6.6a and Table 6.6b (see Table 6.4 and 6.5 for full questions and total number of responses per question).

Table 6.6a Gambling problems (SOGS) in relation to type of gambling [The first figure represents the number of people from each category who endorsed a question, the second figure is the percentage]

Question	Number Games	Racing Activities	Poker machines
	(n=343)	(n=36)	(n=62)
SOGS			
1. Chasing Losses	11 (3.2%)	3 (8.3%)	21 (33.8%)
2. False Claims	12 (3.5%)	4 (11.1%)	5 (8.1%)
3. Gambling Problem	8 (2.3%)	3 (11.1%)	8 (12.9%)
4. Overspending	36(10.5%)	12 (33.3%)	23 (37.1%)
5. Criticised	13 (3.8%)	6 (16.7%)	15 (24.2%)
6. Guilt	18 (5.2%)	5 (13.9%)	16 (25.8%)
7. Couldn't Stop	5 (1.5%)	4 (11.1%)	6 (9.7%)
8. Hidden signs	1 (0.3%)	0 (0.0%)	2 (3.2%)
9. Money Arguments	3 (0.9%)	3 (11.1%)	2 (3.2%)
10. Borrowed: not repaid	3 (0.9%)	0 (0.0%)	2 (3.2%)
11. Lost time: work	1 (0.3%)	0 (0.0%)	0 (0.0%)
Borrowed Money from:			
12. Household Savings	6 (1.7%)	3 (11.1%)	6 (9.7%)
13. Partner or Spouse	3 (0.9%)	3 (11.1%)	5 (8.1%)
14. Relatives/In-laws	0 (0.0%)	2 (5.6%)	5 (8.1%)
15. Banks/Co-ops.	4 (1.2%)	2 (5.6%)	0 (0.0%)
16. Credit Cards	7 (2.0%)	5 (13.9%)	8 (12.9%)
17. Loan Sharks	0 (0.0%)	0 (0.0%)	0 (0.0%)
18. Bonds/Securities	3 (0.9%)	0 (0.0%)	1 (1.6%)
19. Pawned/Sold Goods	2 (0.6%)	0 (0.0%)	0 (0.0%)
20. Bad Cheques	1 (0.3%)	1 (0.3%)	0 (0.0%)

1. Each percentage based upon the number of people endorsing each question divided by the total number of people who gambled regularly on one particular class of activities.

As can be observed from both Table 6.6a and Table 6.6b, the incidence of gambling-related problems is considerably higher in those who gamble on racing activities or poker machines compared with those who only gamble on number games such as

lotteries, keno and bingo. This difference is most strongly observed for the first seven items of the SOGS and questions relating to over-spending and borrowing money

Table 6.6b Gambling problems (PSE) in relation to type of gambling [The first figure represents the number of people from each category who endorsed a question, the second figure is the percentage]

Question	Number Games	Racing Activities	Poker machines
	(n=343)	(n=36)	(n=62)
1. Borrowed Money	8 (2.3%)	8 (22.2%)	5 (8.1%)
2. Depression	9 (2.6%)	6 (16.7%)	10 (16.1%)
3. Family Interests	2 (0.6%)	1 (2.8%)	0 (0.0%)
4. More than could afford	23 (6.7%)	10 (27.8%)	16 (25.8%)
5. Damaged relationship	2 (0.6%)	1 (2.8%)	1 (0.1%)
6. Owed Money	1 (0.3%)	3 (8.3%)	0 (0.0%)
7. Lost Job	2 (0.6%)	0 (0.0%)	0 (0.0%)
8. Considered Crime	1 (0.3%)	0 (0.0%)	1 (0.1%)

1. Each percentage based upon the number of people endorsing each question divided by the total number of people who gambled regularly on one particular class of activities.

(e.g., item 1 and 4 in Table 6.6.b). People who gamble on racing and poker machines (continuous types of gambling) appear more likely to overspend, chase losses, overstate their winnings, experience guilt and depression when they gamble.

Significance tests such as Chi-square cannot be applied to this data because many people gambled on more than one activity thereby violating the independence assumption. Therefore, the relationship between gambling problems and activity was examined using logistic regression analysis. Responses to each SOGS item (YES/NO) were treated as dependent variables which were analysed in relation to participation scores (0,1) for each activity. The results of these analyses are displayed in Table 6.7a. From Table 6.7a, it can observed by inspection of the odds-ratios that participation in racing and poker machines was associated with a greater likelihood of chasing losses: (4.52 times greater for poker machines vs. 7.15 times greater for racing); overspending (14 times for poker machines vs. 11 times greater for racing); spending more than could be afforded (7 times greater for poker machines vs. 4 times greater for poker

machines). Racing was associated with a tenfold increase in the likelihood of having borrowed money to gamble. By contrast, regular number game gambling was associated with a 25 (1/0.04) times reduction in the likelihood of overspending and an 11 (1/0.09) times reduction in the likelihood of spending more than could be afforded.

A second analysis was conducted to determine the best predictor of gambling problems in general as reflected by the total number of SOGS and PSE items endorsed. Standard (or ordinary least squares) multiple regression analysis was used using the three participation scores as independent variables and the total number of SOGS and PSE items endorsed as the dependent variable (Table 6.7b). The Multiple-R for this analysis was 0.50 and R-sq.=0.25, $F(3,221)=24.13$, $p < .001$. Thus, it was found that 25% of the variation in total gambling problems was explained by participation in these three activities. As can be observed from Table 6.7b, regular participation in poker machine or racing gambling was associated with a greater incidence of gambling problems, whereas the reverse was so for gambling on number games. A further comparison of the standardised beta values for racing and poker machines showed no significant difference between the two coefficients ($t < 1$), confirming that racing activities and poker machines are equally likely to be associated with gambling-related problems when one controls for the number of people gambling on each activity.

6.9.2 Discussion: gambling problems and gambling activities

These findings are consistent with Dickerson (1989; 1995), and Dickerson et al., (1991; 1992), who argued that impaired control over gambling was more likely to be associated with continuous forms of gambling. The possibility of making repeated bets in a short time-span, allows players to spend their money more rapidly and increases the likelihood of poor decision-making and risk-taking. For example, a significant percentage of racing and poker machine players reported chasing their losses and finding it difficult to control their gambling, whereas these problems were rarely encountered by bingo, lottery or keno players. There were, however, some differences between the percentages observed for racing and poker machine gambling. Poker machine gamblers were slightly more likely to have overspent or been unable to

Table 6.7a: Logistic regression: specific problems associated with different types of gambling [Only statistically meaningful analyses are presented]

Item	Variable	Beta	Wald†	R	Odds Ratio
Chasing Losses	Number	-0.37	0.21	0.00	0.69
	Poker Mach.	1.51	5.28*	0.19	4.52
	Racing	1.97	7.86**	0.25	7.15
			(80.23% of cases correctly classified)		
Over-Spending	Number	-3.27	6.79**	-0.24	0.04
	Poker Mach.	2.65	7.85**	0.26	14.21
	Racing	2.38	5.73*	0.21	10.84
			(90.90% of cases correctly classified)		
Criticised	Number	-3.54	10.28**	-0.36	0.03
	Poker Mach.	0.14	0.02	0.00	1.15
	Racing	-0.07	0.01	0.00	0.93
			(91.30% of cases correctly classified)		
Experienced Guilt	Number	-2.69	6.07*	-0.26	0.07
	Poker Mach.	1.40	2.25	0.06	4.05
	Racing	-1.81	1.77	0.00	0.16
			(90.96% of cases correctly classified)		
Borrowed Money	Number	-0.93	0.66	0.00	0.39
	Poker Mach.	1.28	1.27	0.00	3.85
	Racing	2.30	4.57*	0.26	9.96
			(96.61% of cases correctly classified)		
Experienced Depression	Number	-3.28	8.55**	-0.37	0.04
	Poker Mach.	2.50	2.82	0.13	12.14
	Racing	2.38	2.61	0.00	5.73
			(92.76% of cases correctly classified)		
More than can afford	Number	-2.36	6.11*	-0.22	0.09
	Poker Mach.	1.95	7.20**	0.25	7.03
	Racing	1.27	2.48	0.07	3.56
			(88.10% of cases correctly classified)		

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 6.7b: MRA (standard) of gambling problems as predicted by type of activity

Variable	Beta	St. Error	St. Beta	t-value
Poker Machines	1.76	0.36	0.31	4.93***
Racing	1.97	0.49	0.23	3.98**
Number Games	-1.24	0.43	-0.18	-2.91**

** p < .01 *** p < .001

control their gambling, whereas racing gamblers were more likely to have borrowed money to gamble, or owed money because of their gambling. Nevertheless, despite these exceptions, the overall pattern of percentages and the strength of association (standardised beta weights) were similar, suggesting that poker machines are no more likely to cause gambling-related problems than racing. In this regard, the results are inconsistent with recent media reports in Australia, which have suggested that poker machines are the most addictive form of gambling. This is because of a confusion between absolute and relative percentages. Poker machines are much more widely available and more frequently played than other continuous forms of gambling, so they will cause *more* problems in absolute terms. Yet, as Table 6.6a, Table6.6b and the regression analyses show, when one controls for the number of players, there are few differences in the relative number of problems observed for each activity.

6.10.1 Gambling Problems in relation to Demographic Characteristics

In order to identify those groups most likely to be at risk, gambling-related problems were examined in relation to demographic characteristics. The total number of SOGS and PSE items endorsed was used the dependent variable and compared across each demographic category (Table 6.8). This method is, of course, limited in that does not indicate how many people were involved nor which questions were, or were not answered. For example, a mean of 1.0 for 120 people could mean 1 'yes' response per person or 10 'yes' responses for 12 people. However, these results may provide a general way of identifying which sub-groups of the population appear most at risk of developing experiencing gambling-related problems. Analyses were conducted using t-tests and one-way ANOVA, and these revealed several significant differences.

For example, there was a significant difference between age-groups, $F(5, 375)=6.30$, $p < .01$. Fisher LSD tests applied to this result showed that the mean for the 18-24 age

group was significantly higher than for the other 5 groups ($p < .05$) and the 25-34 year olds significantly higher than the 55-64 and 65+ age groups. A significant difference was also observed for the 'non-worker' categories, $F(4,147)=4.66$, $p < .01$, with Fisher LSD tests showing that people looking for work endorsed significantly more questions that the retired, student and home duties groups ($p < .05$). A significant difference was also observed for marital status, $F(5, 374)=8.47$, $p < .01$. Fisher LSD tests showed that single and people in de facto relationships having endorsed significantly more questions than the married, widowed, engaged groups. The de facto groups endorsed significantly more questions than the divorced group, who, in turn, endorsed significantly more questions than the married group.

Overall, the figures suggest that gambling-related problems are most likely to be associated with people aged less than 35 years who are looking for work, living in a de facto relationship or who are single. Problems are less likely to be associated with older people, retired people, students and those who are married or widowed.

6.10.2 Discussion: gambling problems and demographic characteristics

These results are generally consistent with the results of previous research (Dickerson et al., 1994, 1995, 1996), which has shown gambling problems to be most common in younger people. These results are consistent with the results presented in Chapter 5 which showed that younger people and men tend to have a greater involvement in gambling than other age-groups, and that they also tend to gamble on a wider range of activities (c.f. Hraba & Lee, 1995). These results are also consistent with recent findings in the U.S., which have shown that gambling problems are typically associated with people less than 30 years old (Volberg, 1997). In Australia, this is possibly related to the availability of gambling opportunities where young people can gamble in hotels, clubs and shopping centres rather just in racing venues or casinos. In South Australia, for example, hotels are popular meeting spots for people aged 18-35 years. There are discos, bars and restaurants, as well as the gaming room. It is likely that younger people feel more comfortable in gambling at such venues rather than in betting agencies which typically attract an older clientele.

Table 6.8 Gambling related problems in relation to demographic characteristics [mean number of 'yes' responses for 28 questions concerning gambling problems]: Overall Mean=0.89 (s.d.=2.1)

Variable	n	Mean (s.d.)
1. GENDER		
Males	208	0.93(2.1)
Females	173	0.83(2.2)
2. AGE †		
18-24 yrs.	23	2.97(4.8)
25-34	65	1.24(2.3)
35-44	97	0.68(1.8)
45-54	77	0.92(2.1)
55-64	45	0.44(1.3)
65+	71	0.40(1.1)
3. WORK STATUS		
Full time	176	0.93(1.1)
Part time	51	1.05(2.3)
Not working	152	0.78(1.9)
4. TYPE OF WORK		
White collar	121	0.92(2.4)
Blue collar	91	1.11(2.4)
Business owners	15	0.34(0.5)
5. 'NON_WORKERS' †		
Looking for work	20	2.42(4.1)
Retired	86	0.50(1.2)
Students	5	0.46(0.9)
Home duties	33	0.58(1.2)
Other	5	0.79(1.2)
10 HOUSEHOLD INCOME		
Less than $10,000	37	0.76(1.6)
10,001 to 19,999	36	0.83(2.4)
20,000 to 29,999	45	1.13(2.6)
30,000 to 39,999	46	0.60(1.5)
40,000 to 49,999	39	1.38(2.5)
50,000+	91	0.78(2.3)
8. PERSONAL STATUS †		
Married	225	0.45(1.0)
Separated/Divorced	40	1.35(2.7)
Widowed	27	0.41(1.6)
De facto	18	2.84(4.8)
Engaged/Planning	14	1.11(3.3)
Single	52	1.87(3.0)

† Statistically significant difference between groups ($p < .05$) using t-test or one-way ANOVA (see text)

The results did not, however, confirm previous findings that gambling problems would be more common among men (e.g., Dickerson et al., 1994, 1995, 1996; Lesieur & Blume, 1987; Mark & Lesieur, 1992; Volberg & Steadman, 1992) In this study, no significant gender differences were found, and this again appears to be the result of the availability of poker machines in this State. In South Australia women are able to gamble on poker machines in suburban locations rather than just in a central urban casinos, and this has undoubtedly increased the accessibility of gambling for women and increased the likelihood of greater spending and the development of gambling problems. This result confirms recent reports from welfare agencies (e.g., Wooton, 1995) which have found that approximately 50% of those seeking assistance for gambling problems were women.

The results for marital status are also consistent with previous research (Abott & Volberg, 1991; Dickerson et al., 1994; 1995; 1996; Lesieur, 1984; Sommers, 1988; Volberg & Steadman, 1992), which has found an association between gambling-related problems and the absence of a stable relationship. According to Lesieur (1984), single people are more likely to gamble heavily because they have more leisure time, greater disposable income and less chance of experiencing social-pressure or criticism from people close to them, e.g., partners or family members. Alternatively, as Jacobs (1988) has suggested, single people may gamble more heavily because this provides them with an escape from loneliness and boredom. People who are unable to find enjoyment or success in other parts of their lives, turn to gambling because it provides excitement and a sense of identity. In both cases, the assumption is that heavy gambling is related to the absence of a relationship; however, this does not say anything about the direction of causation. In many cases, it is possible that people are single or divorced because of gambling, rather than the gambling having commenced once the relationship had ended. Unfortunately, this problem is unresolved in this study because of the nature of the research design which only assessed people's gambling habits at one point in time.

The final finding which emerged in this study related to occupational status. Consistent with Volberg and Steadman (1992), it was found that unemployed people (classified as 'looking for work' in this survey) were more likely to experience gambling problems that other groups. However, as with marital status, it is not clear

whether this status is the result of, or preceded, the development of gambling-related problems. While it would seem logical to assume that excessive gambling would be a likely cause of people losing their jobs, the fact that few work-related problems were reported by the sample suggests that the status of being unemployed precedes the gambling. In much the same way as single people gamble to escape their worries, the unemployed may do likewise, perhaps in the added hope that they will win money to supplement the small amount which they receive from welfare.

6.11.1 The Prevalence of Problem Gambling in South Australia

As discussed in Chapter 5, the prevalence estimate in this study was obtained using the SOGS (Lesieur & Blume, 1987) with the revised cut-off score recommended by the Australian Institute for Gambling Research (Dickerson et al., 1994, 1995, 1996). This revised cut-off score was based upon a study of a clinical sample of problem gamblers New South Wales and showed that a score of 10 correctly classified 100% of the sample of problem gamblers, 7-9 points classified 50% of cases, whereas 5-6 points classified 20% of cases. As the AIGR notes:

> *Based upon...the team's expert opinion it was agreed that scores between 7-9 would correctly include 50% of those at risk (i.e., 50% true positives), and scores of 5-6 would correctly include 20% of those at risk.*" (1996, p. 52)

The results for the twenty SOGS items is displayed in Figure 6.2. Each of the percentages presented is based upon determining the total number of gamblers (weighted) scoring X points on the SOGS and then dividing by the total sample size of n=1206. As can be observed, 0.31% (95% Confidence Interval +/- 0.28%) scored ten or more points and could be classified as probable problem gamblers using the Australian criterion. If extrapolated to the general population of South Australia, it suggests that there were between 3500 and 6600 people in South Australia in July 1996 who were probable problem gamblers (if one takes the upper limit of the confidence interval). Furthermore, based upon Dickerson et al.'s analysis in New South Wales, using the SOGS scores as an index of the likelihood of being 'at risk' of having a gambling problem, these results show that 50% of the 0.5% who scored 7-9 on the SOGS (approx. 2800 people) were probable problem gamblers and 20% of the 0.4% who scored 5-6 points (approx. 900 people). Overall, this would suggest that

that there were 3500 + 2800 + 900 = 7200 probable problem gamblers in South Australia at the time of the survey.

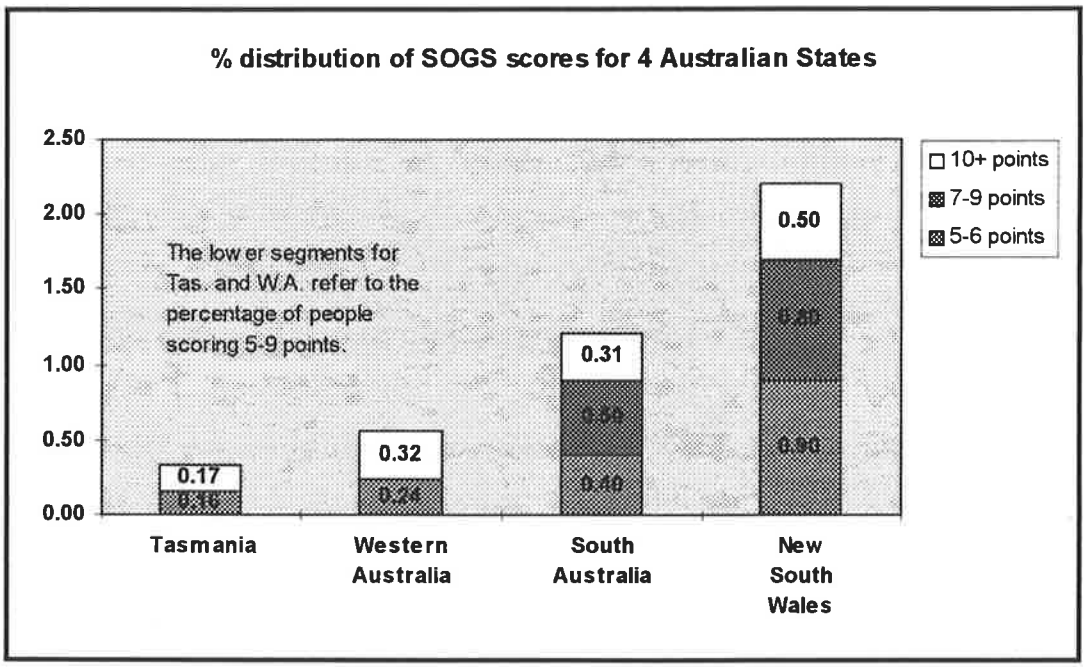


Figure 6.2: Comparison of South Australian prevalence rate with other recent statewide figures [source Dickerson et al., 1996]: percentages based upon total sample n=1206.

6.11.2 Discussion: Prevalence of Gambling Problems

From Figure 6.2, it can be observed that South Australia has a similar prevalence rate (percentage of people scoring 10 or more on the SOGS) to Western Australia (i.e., 0.32%), a higher rate than Tasmania, but a lower rate than New South Wales. South Australia also has another 0.5% (or 5600 people) with significant gambling problems and a further 0.4% with some problems with gambling (4500 people). The percentage of people 'at risk' in South Australia (i.e., 0.5 + 0.4= 0.9%) is higher than in Tasmania -(0.16) and Western Australia (0.24), but almost 50% lower than the figures for New South Wales (0.9+ 0.8=1.7%).

The higher figure observed for New South Wales is to be expected given that gaming machines have been available in suburban clubs since 1956 and that NSW has a 37% higher per capita expenditure on gambling than South Australia. The figures for Tasmania were also as predicted given that this State had no poker machines in clubs and hotels at the time of the survey. However, the comparison between South Australia and Western Australia is of greatest theoretical interest. As noted in Chapter

5 (Section 5.2), South Australia has a lower per capita expenditure on gambling than Western Australia (W.A.), yet W.A. has no poker machines in clubs or hotels, only in its central urban casino. Consequently, the fact that the South Australian prevalence rate is slightly higher than the W.A. figure shows that poker machines are associated with a greater incidence of gambling related problems.

This was confirmed by a further analysis that examined the type of gambling preferred by those who scored 5 or more points on the SOGS. It was found that 60% of these people's problems could be related to poker machines. Although several of the racing punters (30% of this group), also gambled regularly on poker machines, their estimated annual expenditure was so small that it was unlikely to have been the source of their problems. For example, two of the racing punters spent over $20,000 per year on racing activities, but less than $1000 on poker machines. Thus, these results are consistent with those in Section 6.6, which suggested that, although poker machines cause the most problems in absolute terms, they are no more 'addictive' than other continuous activities. In South Australia, 60% of all problem gamblers are likely to be poker machine players. This figure is confirmed by treatment centres in South Australia (Department of Treasury and Finance, 1995), which reported that just over 60% of people seeking assistance from treatment agencies were experiencing problems with poker machines. However, as shown in Chapter 5, over 40% of the population play poker machines compared with approximately 20-25% for racing. Thus, the percentage difference observed for gambling problems (60% vs. 30%) is approximately proportionate to the difference in participation levels (42% vs. 20-25%).

6.12 General Discussion and Methodological Criticisms

Although this study provides a lot of useful information, it is also important to remain cautious. As with any other prevalence survey, this study has a number of serious limitations which must be noted before any policy decision can be made based upon the results. One of these most important is possible biases in the sampling of respondents. Previous research by Dickerson, Baron, Hong, Cottrell (1996), Walker and Dickerson (1996), Volberg (1996) has shown that it is very difficult to identify heavy gamblers and, in particular problem gamblers, using telephone surveys (Lesieur, 1994; Walker & Dickerson, 1996). Many problem gamblers will have their telephones disconnected

because of unpaid bills or will seldom be at home because of their involvement with gambling. Furthermore, problem gamblers, if they can be contacted, are often reluctant to provide truthful responses because they deny that they have a problem, or dislike providing personal information to a stranger over the telephone. Thus, the true extent of gambling-related problems in the community is likely to be underestimated.

The extent of this estimation is partially reflected in a comparison of expenditure estimates in the survey with the actual amount spent in South Australia. For example, if one takes the example of poker machines, it is found that in (1995-96), South Australians spent approximately $325 million dollars on gaming machines. This represents approximately $290 per adult assuming an adult population of 1.12m. (Australian Bureau of Statistics, 1995). The survey figures, however, suggest an amount of only $140 per person which is only 48% of the actual amount. The results suggest: (a). that people are either unable or reluctant to provide accurate details of how much they spent on gambling, or (b). that these surveys do not obtain a representative sample of the 'heaviest' gamblers in the community. Consequently, it is suggested that surveys of this nature cannot be generalised to all the population, but merely to that proportion of the population who are willing, or available, to take part in telephone surveys. This may, or may not include, those who are most susceptible to the development of gambling problems.

Although Lesieur (1994; 1996) argues that some of these problems can be avoided using a door-knock study, it is unlikely that these surveys significantly influence the accuracy of the results. Even when interviewers visit a gambler's house, this does not mean that gamblers will be any more likely to be at home, participate or provide accurate responses. Indeed, as revealed in a recent personal communication between the author and Mark Dickerson, the chief investigator in previous Australian prevalence studies, it was ascertained that recent replications of earlier State studies were obtaining higher prevalence rates using telephone surveys than the door-knock studies. This was completely inconsistent with Lesieur's prediction that the two techniques would produce discrepant results.[2] As a result, Dickerson (1995) concurs

[2] The results for these studies are not, as yet, officially available. The figures may, of course, be higher because of the growth of gambling in the States being researched. However, because the growth rate has been so small in Tasmania, this seems unlikely to be the case.

with Lesieur's pessimistic conclusion that the determination of accurate prevalence rates is not possible with the existing methodologies.

The value of surveys is that they help identify groups at risk and provide a means of comparing different gambling populations. In this sense, this survey has produced results which are consistent with previous research, but which also reveal many important differences of value to policy-makers and researchers in South Australia. Consistent with previous Australian research, this study has shown that gambling problems in this State are most likely to be associated with younger people, the unemployed, and those without a stable relationship. However, in contrast with previous studies, no significant gender differences were observed suggesting that both men and women are equally likely to experience problems with gambling. This appears to be the result of the accessibility and affordability of poker machine gambling, which is the only 'continuous' type of gambling activities which attracts similar numbers of men and women.

Furthermore, as Table 6.7 shows, although poker machines are no more likely to give rise to problems than racing, the fact that so many people participate in this type of gambling means that it is the major source (60%) of gambling-related problems in South Australia. Accordingly, from a practical viewpoint, it is important that greater attention be given to understanding this type of gambling than any other. This task is facilitated by the fact that an established framework is available for the study of this type of gambling, as based upon the work of (Dickerson et al., 1991; 1992; Griffiths, 1995a; Ladouceur et al., 1988; Walker, 1992a, b). Further investigations of this highly 'addictive' form of gambling are provided in Chapters 8-11, which describe the results of four studies designed to apply and extend the findings of previous slot-machine research, using samples of South Australian gamblers.

Chapter 7

Study 3: Age and Gender Differences in Gambling: a questionnaire study of Casino patrons

7.1 Overview

An important finding obtained in the community gambling survey (Chapter 5 and 6) was that involvement in many gambling activities can be reliably predicted by relatively few variables: work status, age and gender. For example, work status was found to predict involvement in simple chance activities such as poker machines, bingo and keno, whereas age and gender were generally predictors of involvement in more skilful activities such as sports-betting, racing and casino games. Specifically, it was found that employed people were more likely to have gambled on chance games than unemployed people, whereas participation in skilled games was associated with males and younger age groups. These results were interpreted in the context of previous research cited in Chapter 3. The results for work status were attributed to the greater disposable incomes of employed people, whereas gender and age differences attracted a variety of explanations ranging from variations in motivation, gender-role socialisation, and accessibility.

It was suggested, for example, that the inverse relationship between age and gambling involvement, particularly in more skilful activities, was related to the decreased cognitive capacities of older people (Mok & Hraba, 1991; Walker, 1992a). The reduced memory, concentration, and sensory acuity of many older people may reduce their confidence and expectations of success (c.f., Bandura, 1977; Rotter, 1966) and increase their fear of failure when they undertake tasks which require complex decisions in the presence of other players, a bookie or croupier. Accordingly, it was suggested that older people would confine their gambling to chance activities such as bingo, lotteries or poker machines because these activities require less concentration and can be played without fear of negative evaluation.

The explanation for gender differences was more complex. Previous explanations based upon stereotypical beliefs concerning gender-appropriate behaviour (e.g., Lindgren et al., 1986), or differences in decision-making ability (e.g., Bruce &

Johnson, 1994; Hudgens & Fatkin, 1985) were rejected. Instead, gender differences in gambling preferences were attributed to motivational factors and the effects of sex-role socialisation. It was argued that women are less likely to gamble on card games, racing and sports events because they may have a dislike of gambling activities which require competition, concentration and skill, and that these adult preferences are likely to be established during childhood and adolescence (Abt & Smith, 1984; Derevensky, Gupta, & Della Cioppa, 1996; Griffiths, 1995a; Ladouceur, Dube, & Bujold, 1994). Griffiths (1995a) argues that because boys' social groups tend to be more competitive, aggressive and individualistic, they grow up with a preference for activities having these qualities, whereas the opposite trend is observed for girls. This is thought to be linked to the fact that competitive, skilled and achievement-related tasks have traditionally been associated with male achievement (e.g., Deaux & Emswiller, 1974; Deaux, White & Farris, 1975; Feather, 1969; Hudgens & Fatkin, 1984; Levin, Snyder & Chapman, 1987; Martinez, 1995), and that women are less self-confident and have lower expectations of success on activities perceived to be masculine (Beyer,1990).

Finally, it was also argued that these gender differences might be related to the accessibility of gambling. For example, the fact that boys are exposed to a wider range of activities by parents and peers (Ladouceur et al., 1994), means that they will be more familiar with the rules of gambling (e.g., card and dice games, how to bet on races). In addition, the fact that the majority of gamblers at many gambling venues (e.g., casinos, racing venues) are men might dissuade many women from participating because women may feel unsafe or uncomfortable about entering venues where most patrons are men (Walker, 1992a). It was hypothesised that if women visit gambling venues primarily to obtain enjoyment and relaxation rather than to win money, or to compete against other players, they will prefer activities which can be undertaken in more private, or relaxed surroundings. In order to investigate these questions, a survey study of gambling motivation and people's perceptions of gambling activities was carried out at the Adelaide Casino.

7.2 Aims and Predictions of Study

Aim 1: Gender and Age Differences in Motivations for Gambling

If the preceding analysis is correct then it was possible to make the following predictions concerning the nature of age and gender differences in gambling. The first was that older subjects and women would have different motivations for gambling. Women and older people would be less likely to gamble because of the challenge, to test their skills, and instead place greater importance upon the enjoyment, relaxation or excitement that the gambling provides. The second prediction was that older people and women would have different beliefs about the nature of gambling activities and gamble in different ways. Specifically, it was predicted that men would be more likely to employ skill in their gambling because of the hypothesised association between male gender and a preference for competition and challenge in task-performance. Furthermore, it was predicted that there would be an interaction between age and gender in these analyses, with the use of skill being more strongly observed in younger males than older males because of hypothesised differences in cognitive capacities (e.g., memory, concentration, sensory acuity) between the two age groups.

In contrast, it was hypothesised that women would rate luck as being more important in how and why they gambled. This was based upon previous research by Deaux et al. (1974, 1975) and Martinez (1995) suggesting that women prefer chance or 'luck-based' tasks and are more likely to attribute positive outcomes to luck rather than to skill.

Aim 2: Gender and Age and Reasons for Avoiding More Skilled Activities

This study also examined people's reasons for not gambling on games of skill. This question was not examined for all 'skilled' activities, but only for the game of blackjack. Blackjack was chosen for two reasons: firstly, because this was the most popular skilled activity available at the Adelaide Casino where the survey was conducted; secondly, because previous research by Delfabbro and Winefield (1997) has shown that people generally rate blackjack as the most skilful gambling activity. In the question, people who did *not* gamble on blackjack were asked to provide reasons why they did not play. Respondents were asked to rate whether a lack of knowledge, dislike of having to use skill and concentration, or the presence of other people

dissuaded them from participating. The purpose of this question was to examine the relative importance of each of these factors, particularly for women and older patrons, who were expected to be the least likely to participate (i.e., as shown by the results of the community gambling survey in Chapter 5).

This question was also designed to examine issues raised in Chapter 2 in relation to the market for gambling products. Chapter 2 discussed the work of Solonsch (1991b), who speculated that many activities (e.g., racing and some casino games) do not attract women because they do not understand the rules of the games, or dislike the atmosphere of the gambling venues. Accordingly, this study investigates the extent to which these factors influence people's preference for blackjack.

Aim 3: To Investigate the Prevalence of Irrational Beliefs in Gambling

Although designed to examine age and gender differences, a secondary aim of this survey was to provide a broad exploratory study of gambling beliefs in Casino patrons. Similar studies of this type have been previously conducted in off-course betting agencies by Dickerson et al. (1987; 1990). Dickerson et al. have noted that such studies are important because of limited information concerning certain areas of the gambling industry. They argue that '...broad exploratory studies, using large pools of variables and subjects... from the casual once-a-year punter to the regular day visitor' (1990, p. 167) are useful in that they allow one to examine relationships between different aspects of gambling behaviour. Much of Dickerson et al.'s work has considered the nature of gambling behaviour (e.g., frequency of betting, development of impaired control). Only limited attention has been given to cognitive variables such as the role of skill, luck and superstitions in gambling. As discussed in Chapter 4, these variables have been studied in relation to casino games in laboratory settings (e.g., Ladouceur et al., 1984; 1986; 1988; 1991), and using the 'speaking aloud' method in club settings (Griffiths, 1994; Ladouceur et al., 1991; Walker, 1992a), but there have been few studies of these behaviours in casinos. Oldman's (1974) study of roulette is one of the few examples.

The present study sought to examine the percentage of casino gamblers who employed skill when they gambled in the form of obtaining knowledge about how to play, reading the odds, using strategies, etc., and also how often they based their

gambling upon superstitions and luck (e.g., the use of lucky numbers, lucky charms, rituals, lucky days, tables, machines, people, etc.). No hypotheses were made concerning these behaviours, although, as noted above, it was expected that men would be more likely to report using skill when they gambled, whereas women would be more likely to report using luck. These differences will be analysed while controlling for the confounding effects of differences in preferences. For example, gender differences in the use of strategies would only be demonstrated if such differences were obtained after controlling for the fact that women were less likely to have gambled on activities where strategies were most likely to be used.

7.3 Method

7.3.1 Subjects

A total of 400 people were approached at the Casino and 275 questionnaires were distributed 102 men and 173 women who agreed to participate. A total of 42 questionnaires were returned from men (i.e., 40.8%) and 78 from women (45%). Thus, the total number of returned questionnaires was 120 (an overall response rate of 43.6%). This rate was only marginally lower than the figure of 43.9% obtained by Dickerson et al. (1990) in their study of off-course betting agencies. The mean age in years of the male respondents was 33.6 (s.d.=17.9) and 49.2 (s.d.=19.0) for the females. A t-test showed that the female respondents were significantly older than male respondents, $t(118)=4.14$, $p < .001$.

7.3.2 Subject Recruitment

The central Adelaide Casino was chosen as the location for the survey so as to obtain a broad range of gamblers, who gambled on a variety of activities. The Casino was preferred to clubs or hotels because it attracts patrons from most parts of Adelaide and also offers a wide range of gambling activities.

At the request of management, the author did not enter the Casino, so the survey was conducted in the foyer just outside the main entrance. This allowed the author to approach people as they were entering or leaving. Ideally, it had been hoped that interviews could be conducted face-to-face at the location. However, because security

staff had prohibited the positioning of seats, tables or benches in this area, it was decided that a 15-20 minute face-to-face interview would be inappropriate for ethical reasons, especially given the elderly status of many patrons. Thus, it was decided that the study would be conducted via a 'take-home' or mail-survey. The interviewer approached patrons as they entered or left the Casino, provided a brief introduction and asked them if they would be willing to take part in the study. If the person agreed to take part, he or she was given a survey in a pre-paid envelope and asked to complete it at home at their own convenience.

The author went to the Casino for intervals of 1.5 to 2 hours on weekdays and weekends over a six week period (a total of 25 visits). The times were varied so that each hour between opening time (10 a.m. (opening time)-8.30 p.m.) had been sampled. No visits were made later in the evening; firstly, because of an inability to distinguish prospective casino patrons from the hundreds of commuters passing by Casino on the way to the train station or Hyatt Hotel complex (note: The Casino is built above the Adelaide railway station and shares the same central stairwell); and secondly, because most people who visited later in the evening came in larger groups and were difficult to approach.

7.3.4 Questionnaire

(a). Involvement

Respondents were provided with a list of gambling activities and asked to indicate whether, and how often, they gambled on each activity. This list contained all activities available at the Adelaide Casino (blackjack, table poker, dice games, poker machines, video keno, video poker and blackjack, roulette and keno), but any other activities available in the State (lotteries, bingo, lucky tickets, racing and sports betting).

(b). Perception of Activities

People were asked to indicate the amount of skill involved in each type of gambling. This question was followed by a qualifying statement to ensure that respondents did not interpret this question as referring merely to how much skill or knowledge 'was required to play?' Players were specifically asked whether they believed their chances of winning could be improved by: (a). Using strategies, (b). Using certain playing

styles, or (c). By gaining practice in the game?' Having answered this question, respondents were asked to rate how skilful they would rate *themselves* in each activity. This question was followed by the same qualifying statement as in Q2.

(c). Reasons for not Playing Blackjack (a game of skill)

This question allowed both closed-ended responses and an open-ended response. Respondents were told that if they did not play blackjack to indicate why they did not play this game. Four reasons were given and subjects were asked to rate the importance of the reason on a 7-point scale where: 1=not important, 4=moderately important, and 7=very important. The four reasons were: (a). You do not know the rules, (b). The games requires too much skill and concentration, (c). You are intimidated by the presence of other people, (d). (Only for female respondents) You are put off by the fact that few women play the game. This was followed by an open-ended question: Are there any other reasons why you do not play this game? Subjects could write several lines if they wished.

(d). *Motivations for Gambling*

Respondents were asked to indicate why they gambled. An open-ended response was included along with the following list of fixed choices: (a). For enjoyment, (b). To win money, (c). To test one's skill, (d). To try one's luck, (e). To socialise with others, (f). To escape worry, (f). To relax. People could give multiple responses. Each response was made on a 7-point rating scale (1=not important, 4= quite important, 7= very important).

(e). *Use of Skill and Chance in Gambling*

This question comprised 10 statements to which subjects had to provide a yes or no response. There were 6 statements relating to lucky or superstitious beliefs which took the form 'Have you ever...?'. Subjects were asked whether they had: lucky numbers, believed in lucky machines, tables, days, people, whether they said prayers when they gambled, whether they engaged in superstitious rituals when they gambled. The skill items consisted of 4 questions relating to whether gamblers believed their success was more related to skilful play than luck; whether they checked the odds of each games before they played; whether they had read any books on how to beat the games, and

whether they used strategies when they played. Those who responded that they used strategies were asked to provide details of the strategy involved and the game (s) in which it was employed.

(f). *Reasons for Persisting when Losing*

If cognitive factors are involved in gambling, it is important to examine whether these are involved in the maintenance of gambling behaviour. Thus, a final question asked subjects to explain what factors made it difficult for them to stop gambling once they had lost money. Three explanations were provided: (a). Because they could not bear walking out knowing that a big win might have been around the corner (simulation heuristic), (b). Because they believed that by skilful play they could win back their losses (illusion of control), (c). Because they believed that their luck would eventually change (secondary control/gambler's fallacy).

7.4 Results

7.4.1 Gambling Involvement

Figure 7.1 shows for each activity the percentage of people in the sample (n=120) who had gambled at least once during the previous 12 months. As can be observed from Figure 7.1, participation rates were considerably higher than those obtained in the Community Gambling Survey (CGS) (Figure 5.1). This is to be expected given that the criterion for sample selection was that participants had gambled at the Casino at least once during the previous 12 months. Most notable is the high participation rates for poker machines (89% vs. 42% for the CGS), keno (53% vs. 15% in the CGS), blackjack (46% vs. 8% for all card and dice games in CGS). A further analysis of the frequency of participation data showed that 23.3% of the sample played poker machines on a weekly basis (c.f. 5% in the CGS), 40% gambled on lotteries with this frequency (c.f. 26% in the CGS), 7.5% gambled on racing (c.f. 2-3% in the CGS). Weekly participation rates for blackjack, and roulette were lower (3.2% and 1.6% respectively); however, this rate was four to five times higher than the weekly participation rates observed for casino games in the CGS.

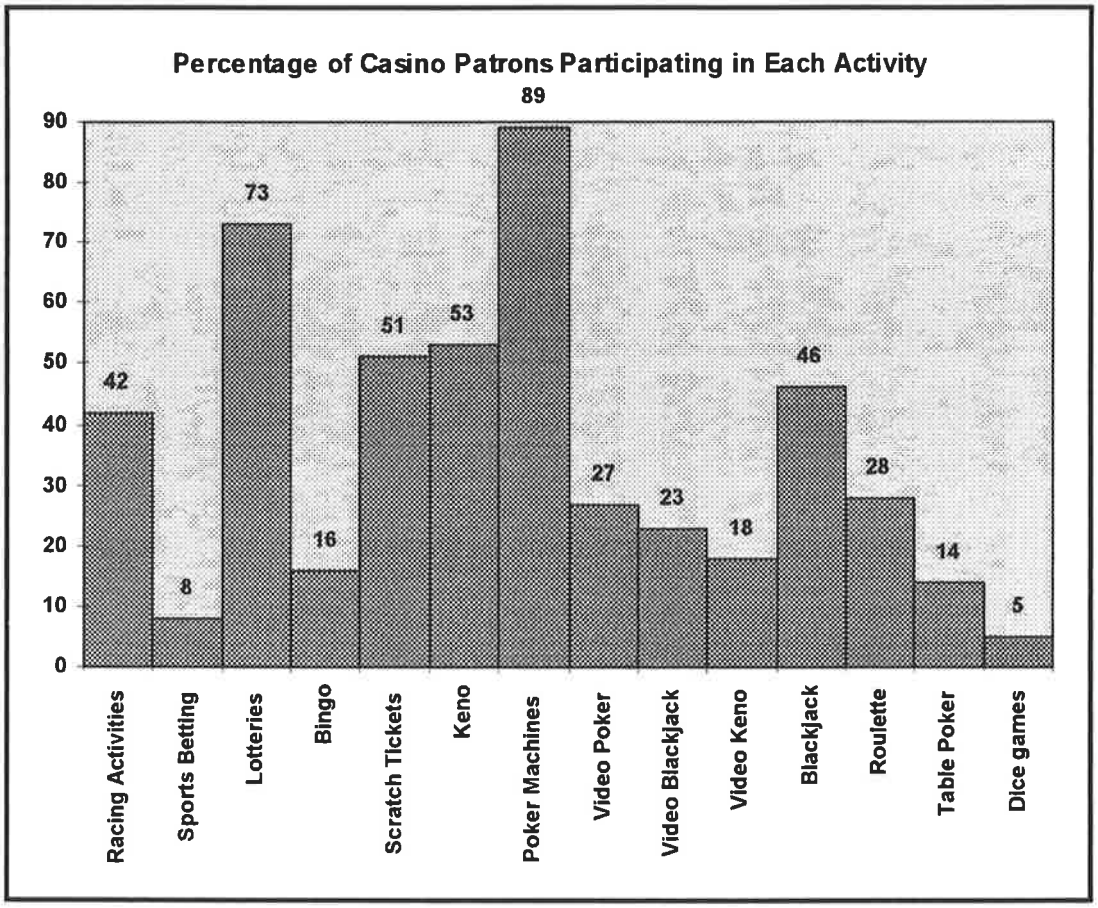


Figure 7.1: Percentage of Casino patrons participating in each activity during the previous 12 months

7.4.2 Gender and Age Differences in Involvement

Figure 7.2 shows that the percentage of men and women in the Casino sample participating in each activity. As can be seen, the pattern of differences observed was generally consistent with those obtained in the CGS. When analysed using chi-square tests (with continuity correction), it was found that men were significantly more likely than women to have gambled on blackjack, $\chi 2(1)=11.28$, $p < .001$, on roulette, $\chi 2(1)=27.07$, $p < .001$, and racing activities, $\chi 2(1)=13.69$, $p < .001$. No significant gender differences were observed for the other activities, with all $\chi 2s < 2$. In addition, no significant associations were observed between gender and the likelihood of a person gambling on a particular activity on a weekly basis.

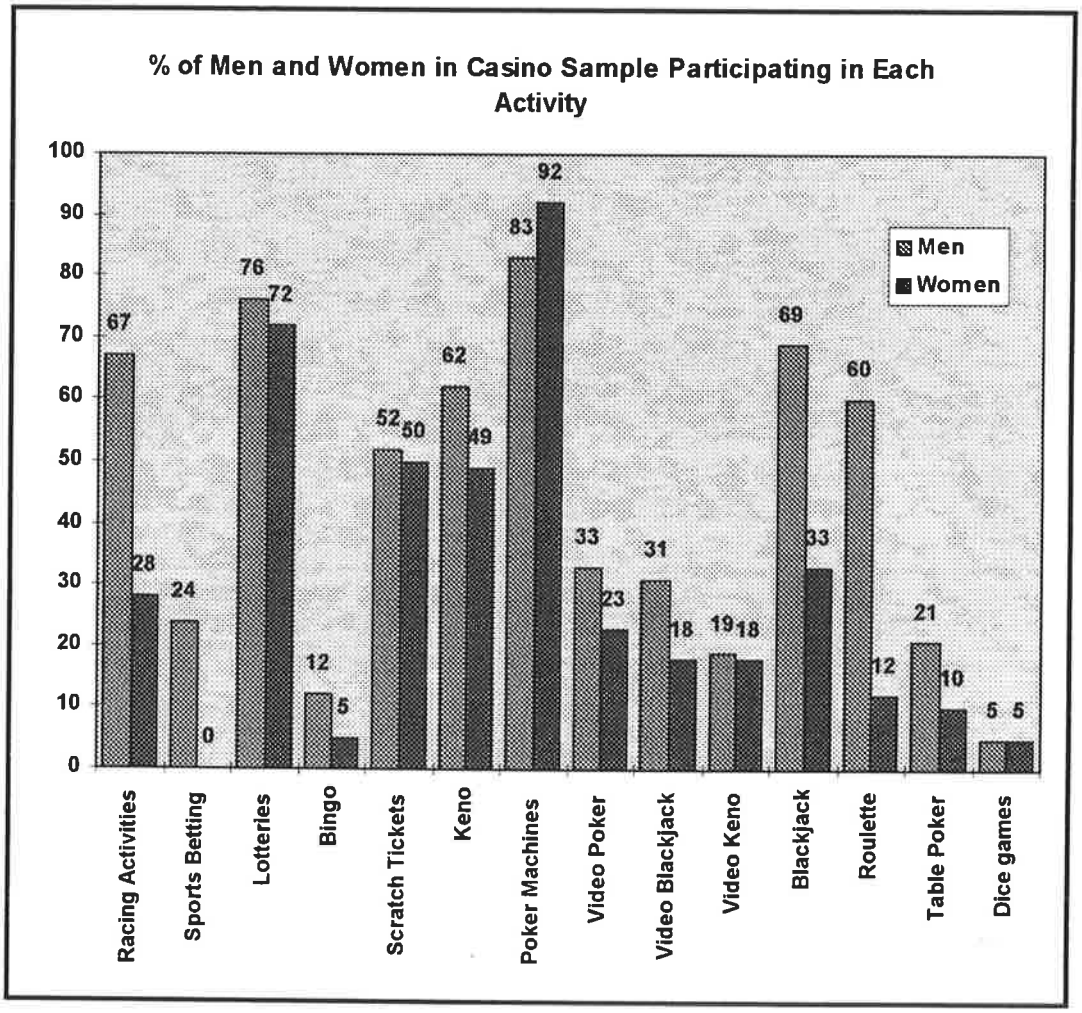


Figure 7.2 Participation rates for men and women in the Casino Sample

A second analysis examined the relation between age and participation in each activity. The results showed that age was negatively associated with involvement in blackjack, $r(118)=-0.65$, $p < .001$, roulette, $r(188)=-0.40$, $p < .001$, racing, $r(118)=-0.32$, $p < .001$, video poker, $r(118)=-0.36$, $p < .001$, video blackjack, $r(118)= -0.50$, $p < .05$). All other correlations were less than 0.30[1] or non-significant. Thus, the results were consistent with those in Chapter 5 which showed that younger people are more likely to gamble on video card games, casino games and racing than older people.

Again, because of the possible confounding effects of age and gender, a logistic regression analysis was conducted to examine which variable was the best predictor of participation in each activity. The results of this analysis are displayed in Table 7.1.

[1] According to Cohen (1992), correlations of less than 0.30 are too small to be of value in most psychological research.

Table 7.1: Logistic Regression: Predictors of Gambling Involvement in Sample of Casino Gamblers

Activity	Variable	Beta	Wald†	R	Odds Ratio
Racing	Gender	-1.22	7.94**	-0.19	0.30
	Age	0.03	5.37*	-0.14	0.98
			(70.83% of cases correctly classified)		
Lotteries	Gender	-0.52	1.16	0.00	0.60
	Age	0.03	5.36*	-0.16	1.03
			(73.33% of cases correctly classified)		
Bingo	Gender	0.15	0.06	0.00	1.16
	Age	0.02	3.02	0.10	1.02
			(84.17% of cases correctly classified)		
Lucky Tickets	Gender	-0.03	0.01	0.00	0.97
	Age	0.01	0.01	0.00	1.00
			(50.83% of cases correctly classified)		
Keno	Gender	-0.43	1.06	0.00	0.65
	Age	-0.01	0.02	0.00	1.00
			(54.17% of cases correctly classified)		
Poker Machs.	Gender	1.38	4.30*	0.17	3.98
	Age	-0.01	0.52	0.00	0.99
			(89.17% of cases correctly classified)		
Video Poker	Gender	0.23	0.24	0.00	1.26
	Age	-0.04	13.01***	-0.28	0.95
			(72.50% of cases correctly classified)		
Video Keno	Gender	0.56	1.06	0.00	1.75
	Age	-0.04	7.46**	-0.22	0.96
			(81.67% of cases correctly classified)		
Video Bjack	Gender	0.41	0.58	0.00	1.51
	Age	-0.09	18.76***	-0.36	0.91
			(79.17% of cases correctly classified)		

Table 7.1 [Continued]

Activity	Variable	Beta	Wald†	R	Odds Ratio
Blackjack	Gender	-0.55	1.11	0.29	0.58
	Age	-0.08	32.19***	-0.43	0.92
			(82.50% of cases correctly classified)		
Table Poker	Gender	-0.36	0.38	0.00	0.70
	Age	-0.03	4.39*	-0.16	0.97
			(85.83% of cases correctly classified)		
Roulette	Gender	-1.96	15.66***	-0.31	0.14
	Age	-0.04	8.15**	-0.21	0.96
			(82.50% of cases correctly classified)		

1. † =1 degree freedom, * $p < .05$ **, $p < .01$, *** $p < .001$
2. Coding: Gender (M=1, F=2).
3. The Odds Ratios show a decreased likelihood of participation as based upon unit increases in the scores for each variable, e.g., 0.14 for gender in roulette means that women (coded, F=2) were 86% less likely to have gambled on this activity. The inverse probability (i.e., 1/0.14= 7.14) means that men were 7 times more likely to have played.
4. Sport and Dice Games are not included because the number of cases was too small for a valid analysis (n=10 and 6 respectively).

The results in Table 7.1 are very similar to those displayed in Table 5.10. Age was found to be a significant predictor of involvement in racing, video card games, video keno, Casino table games (poker, blackjack and roulette). As observed from the sign of the beta coefficients, involvement in these activities was significantly associated with younger age groups. The only inconsistency was for lotteries. In this sample, lottery participation was associated with older people; this association was not observed in the CSG. Gender was a predictor of involvement in racing and roulette, but not in casino card games (as in the CSG). In addition, gender was found to be a predictor of involvement in poker machines, with women more likely to have participated. This was inconsistent with the results of the CSG which showed no significant predictors of poker machine involvement.

7.4.3 Perceptions of Activities

Mean 'perceived skill' and personal skill ratings for each activity are summarised in Table 7.2. These ratings were based upon a 7-point scale with 1=no skill, 4=moderate skill, 7=very high skill. The activities are ranked in ascending order from highest mean perceived skill rating (blackjack) to the lowest (lucky tickets).

Table 7.2 Mean (s.d.) Perceived and personal skill ratings provided for each activity

	Perceived Skill		Personal Skill		
Blackjack	(n=93)	4.43 (1.81)	(n=87)	3.41 (1.82)	Moderate
Racing	(n=83)	4.28 (1.99)	(n=86)	2.85 (2.01)	skill
Table Poker	(n=84)	4.23 (2.13)	(n=79)	2.70 (1.86)	
Sports	(n=79)	3.76 (2.60)	(n=77)	2.36 (1.88)	
Roulette	(n=83)	2.58 (1.76)	(n=79)	2.19 (1.59)	Low
Video Bjack	(n=81)	2.22 (1.67)	(n=80)	2.08 (1.55)	Skill
Video Poker	(n=84)	2.10 (1.51)	(n=82)	1.95 (1.45)	
Dice Games	(n=80)	1.98 (1.33)	(n=78)	1.53 (1.21)	
Poker Machs.	(n=110)	1.87 (1.62)	(n=109)	1.73 (1.19)	
Bingo	(n=94)	1.59 (1.09)	(n=86)	1.29 (0.70)	Very Low
Keno	(n=96)	1.57 (1.04)	(n=95)	1.33 (0.78)	Skill
Video Keno	(n=83)	1.53 (1.05)	(n=80)	1.48 (1.10)	
Lotteries	(n=107)	1.41 (0.91)	(n=104)	1.21 (0.62)	
Lucky Tickets	(n=107)	1.14 (0.61)	(n=96)	1.17 (0.47)	

The results show that gamblers classify blackjack, racing, table poker and sports betting as the most skilful gambling activities (mean rating approximately 4.0 = moderate skill). Roulette and video card games are seen as involving a very small skill component, whereas number games (keno, lotto, etc.) are seen as almost entirely chance determined with mean ratings of less than 2. As might be expected, personal skill ratings were consistently lower than perceived estimates because those who were unfamiliar with each activity generally rated themselves as having no personal skill (i.e., a rating of 1). These results are limited in that they do not indicate the distribution of rating scores for each activity, e.g., what percentage of respondents rated blackjack as involving moderate skill? Thus, a second analysis was conducted. The percentage of people providing a rating of 4 or more (moderate skill-very high skill) was determined for each activity based upon the total number of 4+ ratings/ the total number of responses (n's in Table 7.2). These percentages are displayed in Figure 7.3.

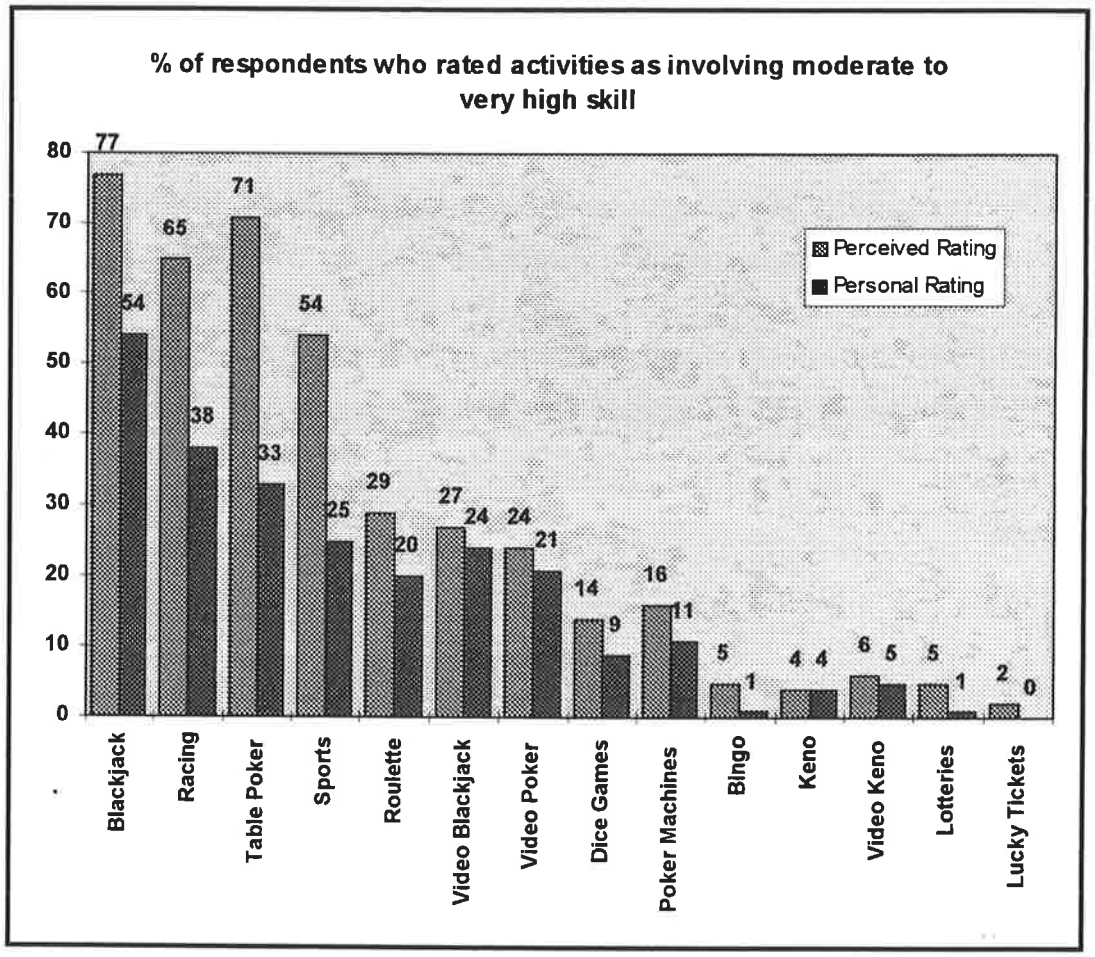


Figure 7.3: Percentage of respondents providing a perceived or personal skill rating or 4 or more for each activity.

As can be observed from Figure 7.3, approximately a half to three quarters of respondents perceived blackjack, table poker, racing and sports-betting as involving moderate to very high skill with approximately a third rating themselves (personal rating) as having this level of skill. Similar ratings were observed in approximately 20%-25% of video-card game players. In addition, 16% of poker machine players responded that poker machines involve moderate to very high skill, with 11% rating themselves as having at least moderate levels of personal skill. Percentages were lower for other activities such as keno, video keno and lotteries, but approximately 5% of respondents rated these number guessing games as involving at least moderate skill.

7.4.4 Gender and Age Differences in Skill Ratings

The hypothesis that men and younger people are more likely to perceive skill and to rate themselves as skilful in gambling activities was investigated using a series of hierarchical multiple regression analyses. Skill rating was the dependent variable and

gender, age and participation scores (0=no participation, 1=participation) were entered as predictors. The aim of this analysis was to assess the contribution of age and gender controlling for participation differences. Thus, participation scores were entered first into the model followed by age and gender which were simultaneously entered into the analysis. In addition, to examine possible interactions between gender and age, a product term was calculated in accordance with the method suggested by Cohen and Cohen (1983) and Jaccard, Turrisi and Wan (1990). This method involved three steps. First, age scores were 'centred' (i.e., mean=0) to reduce the problem of multicollinearity in the subsequent analysis. Second, the centred age scores were multiplied by the dummy variable scores for gender to obtain a product term. Third, this product term was entered into the regression analysis following age and gender. A significant interaction was deemed to have occurred if the addition of this term gave rise to a significant change in R-squared.

As can be observed from Table 7.3, the results provided no support for the hypothesis that men would perceive greater skill in gambling activities than women when controlling for age and participation. Age was a significant predictor of skill ratings in racing, table poker and video blackjack, with the sign of the standardised betas indicating higher ratings having been provided by younger respondents. Across most activities (e.g., racing, table-poker, video blackjack and video poker, dice games, bingo and keno), the best predictors of perceived skill scores were participation scores. As might be expected. those who participated in the activities were more likely to perceive them as involving greater skill. In all cases, there were no significant interactions between gender and age.

Similar results were obtained for the personal skill ratings (Table 7.4). Participation scores predicted ratings for blackjack, racing, table poker, roulette, video blackjack, video poker, dice games, poker machines, keno and video keno. Age was a significant predictor for bingo and male gender for blackjack ratings. However, because of the large number of analyses undertaken, these results may be merely due to chance. In both cases, the contribution to R-squared was very small suggesting that age and gender are not reliable predictors of personal skill ratings when one has controlled for differences in participation.

Table 7.3: Hierarchical Multiple regression analysis of perceived skill ratings in relation to age and gender controlling for participation differences

Activity	Beta	St. Beta	t-value	R-sq.	ΔR-sq.	F(d.f.)
Blackjack						
Participation	0.82	0.22	1.76	0.07	-	
Gender	-0.10	-0.03	< 1			
Age	-0.01	-0.09	< 1	0.08	0.01	
Age x Gender	-0.01	-0.08	< 1	0.08	0.00	1.93 (4,88)
Racing						
Participation	1.45	0.36	3.60**	0.16	-	
Gender	0.37	0.09	< 1			
Age	-0.07	-0.68	-1.80	0.24	0.08	
Age x Gender	-0.03	0.38	1.04	0.25	0.01	6.64 (4,78)***
Table Poker						
Participation	1.33	0.25	2.47*	0.09	-	
Gender	-0.47	0.51	< 1			
Age	-0.03	-0.23	< 1	0.23	0.14	
Age x Gender	-0.01	-0.03	< 1	0.23	<0.01	5.79 (4,79)***
Sports						
Participation	0.03	0.02	< 1	0.10	-	
Gender	-0.04	-0.01	< 1			
Age	-0.08	-0.09	-0.74	0.17	0.08	
Age x Gender	0.02	0.34	< 1	0.18	0.01	5.59 (4,74)**
Roulette						
Participation	0.82	0.23	1.76	0.04	-	
Gender	0.82	0.23	1.62			
Age	-0.06	-0.66	-1.49	0.07	0.03	
Age x Gender	-0.03	0.52	1.26	0.08	0.01	1.93 (4,78)
Video Blackjack						
Participation	0.91	0.26	2.21*	0.13	-	
Gender	0.34	0.10	< 1			
Age	-0.01	-0.03	< 1	0.17	0.04	
Age x Gender	-0.01	-0.22	< 1	0.18	0.01	4.13 (4,76)**
Video Poker						
Participation	0.26	0.12	1.01	0.02	-	
Gender	0.18	0.09	< 1			
Age	-0.02	-0.35	< 1	0.03	0.01	
Age x Gender	0.01	0.31	< 1	0.03	0.00	< 1.00 (4,78)

1. * $p < .05$ ** $p < .01$ *** $p < .001$
2. F-values are associated with the R-squared values for the final models.

[Table 7.3 Continued]

Activity	Beta	St. Beta	t-value	R-sq.	ΔR-sq.	F(d.f.)
Dice Games						
Participation	1.58	0.29	2.65**	0.10	-	
Gender	0.01	0.01	< 1			
Age	-0.09	-0.55	-1.30	0.14	0.04	
Age x Gender	0.02	0.37	< 1	0.15	0.01	< 1.00 (4,75)
Poker Machines						
Participation	0.97	0.17	1.69	0.03	-	
Gender	0.29	0.09	< 1			
Age	-0.25	-0.30	< 1	0.05	0.02	
Age x Gender	0.01	0.17	< 1	0.05	0.00	< 1.00 (4,105)
Bingo						
Participation	0.98	0.35	3.38**	0.13	-	
Gender	-0.12	-0.05	< 1			
Age	0.02	0.34	< 1	0.13	0.00	
Age x Gender	0.01	-0.33	< 1	0.14	0.01	3.54 (4,88)*
Keno						
Participation	0.45	0.21	2.03*	0.04	-	
Gender	0.03	0.09	< 1			
Age	-0.01	-0.03	< 1	0.04	0.00	
Age x Gender	0.01	0.04	< 1	0.04	<0.01	1.06 (4,91)
Video Keno						
Participation	0.36	0.15	1.35	0.03	-	
Gender	0.16	0.08	< 1			
Age	-0.02	-0.37	< 1	0.03	0.00	
Age x Gender	0.01	0.32	< 1	0.04	0.01	< 1.00 (4,78)
Lotteries						
Participation	0.03	0.01	< 1	0.01	-	
Gender	0.18	0.10	< 1			
Age	-0.01	-0.17	< 1	0.04	0.04	
Age x Gender	0.01	-0.07	< 1	0.03	0.00	< 1.00 (4,102)
Lucky Tickets						
Participation	0.04	-0.03	< 1	0.01	-	
Gender	0.07	0.06	< 1			
Age	-0.01	-0.13	< 1	0.03	0.02	
Age x Gender	0.01	-0.08	< 1	0.03	0.00	< 1.00 (4,85)

1. * p < .05 ** p < .01 *** p < .001
2. F-values are associated with the R-squared values for the final models.

Table 7.4: Hierarchical Multiple regression analysis of personal skill ratings in relation to age and gender controlling for participation differences

Activity	Beta	St. Beta	t-value	R-sq.	ΔR-sq.	F(d.f.)
Blackjack						
Participation	1.70	0.45	3.73***	0.14	-	
Gender	-0.93	-0.26	-2.26*			
Age	0.02	0.04	< 1	0.21	0.07	
Age x Gender	0.01	0.02	< 1	0.21	<0.01	5.60 (4,82)***
Racing						
Participation	2.04	0.50	5.11***	0.28	-	
Gender	-0.70	-0.17	-1.45			
Age	0.02	0.14	< 1	0.31	0.03	
Age x Gender	-0.01	0.02	< 1	0.31	<0.01	8.48 (4,77)***
Table Poker						
Participation	1.92	0.42	4.05***	0.19	-	
Gender	-0.74	-0.20	-1.56			
Age	-0.01	-0.03	< 1	0.24	0.14	
Age x Gender	-0.01	-0.01	< 1	0.24	<0.00	5.77 (4,74)***
Sports						
Participation	0.07	0.18	0.82	0.09	-	
Gender	-0.86	-0.23	-1.69			
Age	-0.04	-0.39	-0.40	0.11	0.02	
Age x Gender	0.02	0.36	< 1	0.12	0.01	1.82 (4,74)
Roulette						
Participation	0.90	0.28	2.10*	0.06	-	
Gender	0.59	0.18	1.22			
Age	-0.05	-0.66	-0.62	0.06	<0.03	
Age x Gender	0.03	0.61	1.43	0.09	0.03	1.59 (4,74)
Video Blackjack						
Participation	0.86	0.26	2.17*	0.10	-	
Gender	0.29	0.09	< 1			
Age	-0.03	-0.32	< 1	0.10	<0.01	
Age x Gender	0.01	0.21	< 1	0.11	0.01	2.22 (4,75)
Video Poker						
Participation	1.26	0.42	3.90***	0.17	-	
Gender	0.10	0.03	< 1			
Age	0.02	0.03	< 1	0.17	<0.01	
Age x Gender	0.01	0.03	< 1	0.17	<0.01	4.06 (4,77)**

1. * p < .05 ** p < .01 *** p < .001
2. F-values are associated with the R-squared values for the final models.

[Table 7.4 continued]

Activity	Beta	St. Beta	t-value	R-sq.	ΔR-sq.	F(d.f.)
Dice Games						
Participation	1.20	0.24	2.14*	0.05	-	
Gender	-0.42	-0.17	-1.24			
Age	0.01	0.04	< 1	0.10	0.05	
Age x Gender	0.01	0.02	< 1	0.10	<0.01	2.09 (4,74)
Poker Machines						
Participation	0.98	0.23	2.33*	0.03	-	
Gender	0.08	0.03	< 1			
Age	-0.03	-0.56	-1.38	0.11	0.08	
Age x Gender	0.01	0.27	< 1	0.12	0.01	3.47 (4,104)*
Bingo						
Participation	0.34	0.20	1.78	0.04	-	
Gender	-0.33	0.17	-0.23			
Age	-0.04	1.17	2.72**	0.05	0.01	
Age x Gender	-0.01	-0.01	-1.74**	0.13	0.08	2.09 (4,81)
Keno						
Participation	0.36	0.22	2.15*	0.05	-	
Gender	0.02	0.01	< 1			
Age	0.01	-0.36	< 1	0.06	0.01	
Age x Gender	-0.01	0.36	< 1	0.08	<0.01	1.56 (4,90)
Video Keno						
Participation	0.59	0.24	2.10*	0.05	-	
Gender	0.29	0.13	< 1			
Age	-0.03	-0.36	-0.51	0.06	0.01	
Age x Gender	0.02	0.56	1.29	0.08	0.03	1.69 (4,75)
Lotteries						
Participation	0.16	0.10	< 1	0.01	-	
Gender	0.07	0.06	< 1			
Age	-0.01	-0.34	< 1	0.01	<0.01	
Age x Gender	0.01	0.29	< 1	0.09	<0.01	< 1.00 (4,99)
Lucky Tickets						
Participation	0.06	0.06	< 1	<0.01	-	
Gender	0.11	0.12	< 1			
Age	0.01	0.03	< 1	0.02	0.01	
Age x Gender	-0.01	-0.06	< 1	0.11	0.01	< 1.00 (4,91)

1. * p < .05 ** p < .01 *** p < .001
2. F-values are associated with the R-squared values for the final models.

7.4.5 Reasons for Avoiding Skilled Activities (Blackjack)

This section comprised four closed-ended questions and one open-ended question. The results for the closed-ended questions are displayed in Table 7.5. This table shows the mean response for each question as based upon a 7-point rating scale which required respondents to rate the importance of each reason (1=not important, 4=moderately important, 7=highly important). Overall, the results show that these explanations were generally regarded as being of low importance in determining whether people gambled on blackjack. However, this is only because a large number of respondents (approximately 50%) gave a response of 1 to each statement. Of greater importance perhaps is the percentage of people who rated each explanation as being of at least moderate importance. These percentages showed that nearly 50% of respondents avoided blackjack because it contained too much skill and concentration and 40% avoided it because they did not know the rules. Approximately a third indicated that the presence of other people deterred them from playing. Of the women who responded to question 4, less than 25% responded that the absence of women at the tables was a factor in explaining why they did not play.

Table 7.5 Reasons given for not playing blackjack (the most popular skilled game)

Explanation	Mean (s.d.)	% Giving rating of 4 or greater
(1). Don't know the rules	(n=45) 2.98 (2.39)	40.0
(2). Too much skill & concentration	(n=43) 3.07 (2.10)	49.0
(3). Intimidated by other people	(n=40) 2.55 (2.23)	32.5
(4). Few women play the game†	(n=31) 2.13 (2.05)	22.6

1. † Only women answered this question
2. A score of 4 indicates that the reason was considered moderately important.

Few people provided useful answers to open-ended question. The only other explanations related to a dislike of the activity (e.g.,' It's too boring', 'I don't enjoy it'), the lack of large monetary prizes (e.g., 'Doesn't pay enough') and the cost of the activity (e.g. 'Too expensive', 'Can't afford it'). These other 'explanations' were mentioned by fewer than 10% of the total sample, so it was not possible to conduct a detailed content analysis.

Gender comparisons were conducted on the means and percentages in Table 7.5. The results of this analysis are displayed in Table 7.6.

Table 7.6 Gender differences in explanations given for not playing blackjack (the most popular skilled game)

Explanation	Mean (s.d.)	% Giving rating of 4 or greater
Men		
(1). Don't Know the Rules	(n=10) 2.20 (2.15)	20.0
(2). Too much skill & Concentration	(n=9) 2.00 (1.58)	22.2
(3). Intimidated by other people	(n=8) 2.13 (1.36)	25.0
Women		
(1). Don't Know the Rules	(n=35) 3.20 (2.44)	45.7
(2). Too much skill & Concentration	(n=34) 3.35 (2.15)	55.9
(3). Intimidated by other people	(n=32) 2.66 (2.40)	34.4

Note: No gender comparison possible for Q4

The mean responses given by men and women to each question were compared using t-tests for independent samples. No significant differences were found: $t(43)=-1.17$, n.s., $t(41)=-1.76$, $p > .05$, $t(38) < 1$) respectively for Questions 1, 2 and 3. Percentages were compared using Fisher Exact Tests because of violations of the minimum expected frequency assumption of Chi-square analysis. Despite the large percentage differences for Q1 and Q2, no significant differences were found because of the small number of cases for each analysis.

Correlation analyses were undertaken to analyse the relationship between age and responses to the three questions. These analyses revealed a significant negative correlation between age and responses to question 1, $r(45)=-0.33$, $p < .05$, but no relationship between age and responses to Q2, $r(43)=-0.16$, $p > .05$, Q3, $r(40)=-0.27$, $p > .05$, or Q4, $r(38)=0.01$, $p > .05$. The significant negative correlation suggested that older people were more likely to know the rules of blackjack than younger people.

7.4.6 Motivations for Gambling

Respondents were asked to rate the importance of seven motivational factors in determining why they gambled. The overall responses, gender differences in responses and age correlations are presented in Table 7.7.

Table 7.7 Motivations for gambling in relation to gender and age

Motivation	Overall Mean (s.d.)	Men Mean (s.d.)	Women Mean (s.d.)	t-value	Age Correlation
	(n=115)	(n=42)	(n=75)	(df=118)	(df=117)
For Enjoyment	5.25 (1.85)	5.38 (1.70)	5.17 (1.93)	< 1.00	-0.13
To Win Money	4.47 (2.04)	4.58 (1.90)	4.27 (2.10)	< 1.00	-0.34***
To Test Skills	2.60 (1.89)	3.29 (2.03)	2.21 (1.71)	3.04**	-0.39***
To Try Luck	4.00 (1.90)	4.14 (1.75)	3.92 (1.99)	< 1.00	-0.12
To Socialise	3.81 (2.09)	3.86 (1.91)	3.79 (2.20)	< 1.00	-0.32***
To Escape Worry	1.71 (1.43)	1.69 (1.46)	1.72 (1.42)	< 1.00	-0.07
To Relax	3.41 (2.20)	2.79 (2.08)	3.76 (2.21)	2.34*	0.20

* $p < .05$ *** $p < .001$

As can be observed, women were significantly more likely to gamble 'to relax' than men, whereas men rated 'testing their skills' as being significantly more important. In addition, it was found that younger people were significantly more likely to rate 'testing their skills', 'winning money' and 'socialising' as important motivations for their gambling.

A second analysis was conducted to examine whether motivation was related to certain types of gambling activity and whether effects for age and gender would remain significant after controlling for differences in participation. A series of standard[2] (or ordinary least squares) multiple regression analyses were conducted with each motivation as the dependent variable. Predictor variables included gender, age and four participation variables (coded 0=participation, 1=no participation). These participation variables included: racing, poker machines, casino games, video cards and number games. For the 'casino' variables, a score of '1' was given to any person who gambled on at least one casino table game; for 'video cards', a score of '1' was given if the person gambled on video poker or video blackjack; finally, for number games, a person scored '1' if he or she gambled on lotteries, keno, bingo or lucky tickets. This analysis

[2] Since differences in participation are associated with gender and age, it is difficult to justify a hierachical procedure that enters participation scores first.

revealed only two significant results. Racing was found to be a significant predictor of a motivation to 'test one's skills' and 'winning money', whereas age was found to be a significant predictor of 'winning money'. The complete regression analyses for these two results are displayed in Table 7.8. From the sign of the beta weights, it can be observed that younger people and racing participants were more likely to gamble to win money. Racing participants were also motivated by a need to test their skills.

Table 7.8. Multiple regression analysis of motivations for gambling [only significant models are presented]

Motivation	Beta	St. Error	St. Beta	t-value
To Win Money				
Gender	0.29	0.42	0.07	< 1
Age	-0.03	0.01	-0.32	-2.53*
Racing	1.10	0.40	0.27	2.74**
Poker Machines	-0.25	0.59	-0.04	< 1
Casino Games	-0.15	0.48	-0.04	< 1
Video Cards	-0.14	0.42	-0.03	< 1
Number Games	-0.58	0.65	-0.08	< 1
		[R-sq.= 0.18, Adj. R-sq.= 0.13, F (7, 109)= 3.47, p < .01]		
To Test Skills				
Gender	-0.33	0.37	-0.08	< 1
Age	-0.02	0.01	-0.19	-1.57
Racing	1.01	0.35	0.26	2.88**
Poker Machines	0.40	0.52	0.07	< 1
Casino Games	0.52	0.42	0.14	1.25
Video Cards	-0.09	0.37	-0.02	< 1
Number Games	-0.88	0.57	-0.13	-1.54
		[R-sq.= 0.26, Adj. R.sq.= 21, F (7, 109)= 5.55, p < .001]		

* p < .05 ** p < .01 *** p < .001

7.4.7 The Use of Skill and Luck in Gambling

Respondents were presented with a series of statements relating to to the use of skill vs. luck in their gambling. The overall percentage of people, and the percentage of men and women endorsing each item are presented in Table 7.9 which shows that beliefs concerning the role of luck in gambling are generally more prevalent than beliefs or behaviour relating to the use of skill. Over three quarters of the sample believed that some people are 'naturally lucky gamblers'. Approximately 60% have their own lucky numbers and believe that certain days or nights are luckier than others. Almost half

believed that certain machines or tables are lucky, whereas almost a third admitted to engaging in superstitious rituals to improve their chances of winning. By contrast, less than half of the sample reported that they check the odds of the game before playing. Few believed that their successes were due more to skill than luck, and very few had read any books to learn more about how to improve their knowledge or to improve the odds of the game. However, a large percentage of people in the sample indicated that they used some form of strategy when they gambled.

Table 7.9: Gender and age differences in the use of skill and luck in gambling

Motivation	Overall	Men	Women		Age Corr.
	(n=119)	(n=42)	(n=77)	(df=1)	(df=119)
Skill	%	%	%	$\chi 2$	r
Success due to skill not luck	21.8	35.7	13.0	7.11**	0.04
Checks the odds before playing	41.2	66.7	27.3	15.82***	-0.51***
Read books on how to win	13.3	31.0	3.9	14.85***	-0.25*
Used strategies when gambling	66.4	85.7	55.8	9.96**	-0.42***
Luck					
Uses or has lucky numbers	59.2	59.5	59.7	< 1	-0.02
Believes in lucky machines/tables	47.9	50.0	47.4	< 1	-0.13
Believes in lucky gamblers	76.5	73.8	77.9	< 1	-0.02
Uses superstitious rituals	29.1	31.0	28.6	< 1	-0.37***
Uses lucky charms	6.7	9.5	5.3	< 1	-0.12
Believes in lucky days/nights	60.5	69.0	55.8	1.47	-0.31***

* $p < .05$ ** $p < .01$ *** $p < .001$

There were no significant gender differences for beliefs or behaviours relating to luck. However, men were significantly more likely to attribute their successes to skill, to check the odds before they gamble, to have read books on gambling and to employ strategies when they gamble. No gender differences were observed for the beliefs relating to luck. However, there were a number of significant correlations between age and the beliefs and behaviours listed in Table 7.9. Younger people were significantly more likely to check the odds before they played, and to attribute their successes to skill. They were also more likely to use superstitious rituals when they gamble and to believe that some days or nights were luckier than others.

As both the effects for age and gender are likely to be related to each other and also the type of gambling activity preferred by each gender and age-group, the results in

Table 7.9 were further examined using logistic regression analysis. The dependent variable was the response given to each question in Table 7.9 (0=no, 1=yes). Age, gender and the participation scores (0,1) for racing, poker machines, video cards, casino games and number games were entered as predictors. The significant models generated by these analyses are presented in Table 7.10. The results show no effects for age, but several significant effects for gender and participation. Men were five times (1/0.20 odds ratio) more likely than women to attribute their successes to skill. They were also four times (1/0.26) more likely to use strategies when they gambled and eight times (1/0.12) more likely to have read books on how to win.

Finally, these beliefs were also associated with certain types of activity. People who gambled on video-card games and racing were ten times more likely than other gamblers to have read books on how to win, whereas those who gambled on casino table games were five times more likely than other gambles to check the odds before they gambled.

7.4.8 Reasons for persisting when losing

Whereas the preceding analyses considered the prevalence and predictors of beliefs and behaviours concerning skill and luck, these next questions examined whether cognitive factors were related to gambling persistence. Respondents were asked to rate the importance of luck, skilful play, and hope of a big win in determining why they found it difficult to stop gambling when they were losing. Anticipation of a big win was rated as moderately to very important by 52% of gamblers (Mean=3.18. s.d.=1.74). No gender differences were observed (Means=Overall mean). However, there was a small negative correlation between ratings scores and age, $r(116)=-0.25$, $p < .01$, with younger people rating this explanation as more important.

Forty-five percent of people rated 'being able to play well to recover losses' as moderately to very important (Mean=3.01, s.d.=1.82). Men rated this explanation as significantly more important than women (M=3.52, s.d.=2.03 vs M=2.72, s.d.=1.63), $t(116)=2.21$, $p < .05$. There was also a negative correlation between this variable and age, $r(116)=-0.45$, $p < .001$) suggesting that younger people are more confident of being able to recover their losses using skilful play than are older people. Finally, 58% of respondents rated 'believing that luck would change' as moderately to very

important (Mean=3.53, s.d.=1.70). Ratings for this variable did not differ significantly between men and women (M=3.93, s.d.=1.79 vs. M=3.31, s.d.=1.61), t(114)= 1.91, n.s., but were negatively correlated with age, r(116)=-0.28, p < .01.

Table 7.10: Logistic regression analysis of gambling beliefs and behaviours

Item	Variable	Beta	Wald†	R	Odds Ratio
Success due to skill	Gender	-1.61	7.64**	-0.21	0.20
	Age	0.03	3.20	0.10	1.03
	Poker Mach.	-0.11	0.02	0.00	0.90
	V. Cards	0.60	1.01	0.00	1.81
	Racing	0.16	0.09	0.00	1.18
	Casino	0.84	1.15	0.00	2.33
	Num. Games	-1.37	3.21	-0.10	0.26
			(76.47% of cases correctly classified)		
Uses strategies when gambling	Gender	-1.36	5.38*	-0.15	0.26
	Age	0.01	0.07	0.00	1.00
	Poker Mach.	1.04	1.96	0.00	2.83
	V. Cards	0.32	0.38	0.00	1.38
	Racing	0.52	1.11	0.00	1.68
	Casino	0.62	1.29	0.00	1.86
	Num. Games	-1.40	2.48	-0.06	0.25
			(74.79% of cases correctly classified)		
Read books on how to win	Gender	-2.11	5.49*	-0.19	0.12
	Age	0.03	1.15	0.00	1.03
	Poker Mach.	-1.16	1.47	0.00	0.31
	V. Cards	2.37	6.03*	0.21	10.72
	Racing	2.16	5.83*	0.20	8.69
	Casino	0.39	0.14	0.00	1.48
	Num. Games	1.40	0.00	0.00	1.03
			(89.08% of cases correctly classified)		
Checks odds of game	Gender	-0.76	1.93	0.00	0.47
	Age	-0.02	2.03	-0.01	0.98
	Poker Mach.	-1.07	1.78	0.00	0.34
	V. Cards	0.75	1.94	0.00	2.11
	Racing	0.48	0.89	0.00	1.63
	Casino	1.69	7.41**	0.18	5.44
	Num. Games	-0.28	0.12	0.00	0.75
			(80.67% of cases correctly classified)		

1. † =1 degree freedom, * p < .05 **, p < .01, *** p < .001
3. Coding: Gender (M=1, F=2).

Again, because of the possible confounding effects of age, gender and differences in participation, standard (or ordinary least squares) multiple regression analyses were

undertaken. Ratings on the three explanations were the dependent variables and age, gender and participation scores were entered as predictors. As can be observed from Table 7.11, age was significantly associated with the belief that losses can be recovered using skilful play, but not associated with the anticipation of large wins or the belief that 'luck will change'. Anticipation of obtaining a large win was significantly related to poker machine gambling, whereas 'hoping that luck will chance' was related to racing. In all three cases, however, the level of explanation was very small.

Table 7.11: Multiple regression analysis of cognitive explanations for persistence

Explanation	Beta	St. Error	St. Beta	t-value (df=118)
Anticipation of a large win				
Gender	0.42	0.37	0.12	1.43
Age	-0.01	0.01	-0.17	-1.13
Racing	0.60	0.35	0.17	1.70
Poker Machines	1.15	0.51	0.21	2.27*
Casino Games	0.42	0.43	0.12	< 1
Video Cards	0.08	0.37	-0.02	< 1
Number Games	-0.32	0.54	-0.05	< 1
	[R-sq.= 0.15, Adj. R-sq.= 0.10, F (7, 108)= 2.76, p < .05]			
Losses recovered Using Skilful Play				
Gender	0.01	0.36	0.01	< 1
Age	-0.03	0.01	-0.31	-2.56*
Racing	0.58	0.35	0.16	1.67
Poker Machines	-0.07	0.50	-0.01	< 1
Casino Games	0.35	0.42	0.10	< 1
Video Cards	0.16	0.37	0.04	< 1
Number Games	-0.42	0.53	-0.07	< 1
	[R-sq.= 0.24, Adj. R-sq.= 0.19, F (7, 108)= 4.91, p < .001]			
Hoping that Luck will Change				
Gender	0.09	0.35	0.02	< 1
Age	-0.01	0.01	-0.12	< 1
Racing	0.79	0.34	0.23	2.33*
Poker Machines	-0.60	0.49	-0.11	-1.27
Casino Games	0.63	0.41	0.19	1.56
Video Cards	-0.21	0.36	-0.06	< 1
Number Games	-0.09	0.52	-0.15	< 1
	[R-sq.= 0.18, Adj. R-sq.= 0.12, F (7, 108)= 3.31, p < .01]			

* p < .05

7.5 Discussion

(a). *Gambling Preferences and Perceptions of Activities*

Consistent with the results of the CGS presented in Chapter 5, this study revealed that preferences for gambling activities are reliably predicted by gender and age. Once again, it was found that men were significantly more likely to gamble on racing and roulette, whereas younger people were generally more likely to have gambled on most casino games. However, there were also several discrepancies. For example, whereas gender was found to be a significant predictor of involvement in blackjack, table-poker, video-blackjack or bingo in the CSG, no significant gender differences were observed in the Casino sample (see Table 7.1). In addition, it was found that age was a significant predictor of participation in poker machine and lottery gambling, with involvement in both activities significantly higher in older age groups.

It is likely that these discrepancies are the result of sampling differences. Unlike the CSG which obtained a random sample from the entire State, the present study only included people who gambled at the Adelaide Casino. Thus, because people in the Casino survey had to be Casino gamblers in order to participate, they were not only more likely to gamble in general, but also to gamble on those activities available at the Casino (see Chapter 5). As a result, the sample obtained a disproportionately large percentage of women who gambled on Casino table games.

A further sampling bias in this study arose from the final sample not being stratified for gender and age. Instead, the sample contained a disproportionately large percentage of women aged 55 years or more. This was due to the fact that women were more likely to agree to participate in the study (see Cowles & David, 1987), were generally more helpful than the male gamblers approached at the Casino, and because most sampling was undertaken during daylight hours. Discussions with Casino staff revealed that different times of the day are associated with different types of patrons. In the morning (10 a.m.-12 a.m.) the majority of visitors to the Casino tend to fall into one of three categories: (1) Women aged over 55 years who come to play keno and the poker machines, (2) Regular gamblers (usually men aged over 55 years from European backgrounds) who come to play roulette and card games and usually stay until the evening, (3) Younger males, aged 18-35 years who come to play table games

and two-up. In the afternoon, 1 p.m.-6 p.m., most gamblers tended to be women aged over 55 years (this was the quietest time for the Casino), whereas the evening (7 p.m.-10 p.m.) generally attracted younger people. People who visited the Casino in the evening were more likely to arrive in groups, or as couples, and came mainly for entertainment rather than to win money. Such people were generally younger (usually less than 40 years of age) and frequently spent most of their time in the bars and restaurants and only gambled when they had finished their meals.

Although an attempt was made to obtain a representative sample from each of these groups, it was not possible, because of the difficulty of sampling people in groups, to achieve this goal during the early evening sessions. Thus, the sample was biased towards those who gambled during the day[3], and contained a disproportionate number of older women who gambled on poker machines, younger men who gambled on table games and also people who gambled heavily. For this reason, it is likely that these results cannot be generalised to the population of people who visit the Adelaide Casino at all hours, but rather those who gamble during the day. Furthermore, in acknowledgment of points recently raised by Ladouceur, Arsenault, Dube, Freeston, and Jacques (1996), it is recognised that the present sample was likely to contain an over-representation of people who gamble excessively, which makes it difficult for these results to be generalised to gamblers in general.

Nevertheless, despite the confounding of age and gender, it was possible to reduce the extent of this problem using a variety of regression techniques. These method made it possible to examine the unique contributions of age and gender to be assessed while controlling for differences in participation. This analysis was first applied to the skill ratings provided for each activity. These results showed that neither gender nor age was related to how much skill (perceived or personal) was ascribed to each activity. This was inconsistent with the hypothesis that predicted higher ratings would be positively associated with male gender and younger age groups, and casts doubt upon the suggestion that older people or women are less likely to attempt to apply skill when they gamble. Although this factor may still play a role in influencing a person's

[3] This study almost had to be abandoned because of difficulties with Casino security. Although permission was granted to undertake the study, some security staff refused to believe that the author's identification was genuine and had to seek confirmation. Some also accused the author of 'harassing' the Casino's patrons and requested that the author try to approach single people rather than groups, because this might lead to complaints. Thus, sampling proved to be very difficult during the evening.

initial decision to gamble, it appears that once different people are participating, their gambling tends to show greater similarities than differences. In this connection, these results confirm similar points made by Cornish (1978), Dickerson (1984), Dickerson et al. (1988), who, in reference to gender differences in racing gambling, argue that '...once a person has become a better their sex is unrelated either to their level of involvement or indications of impaired control.' (1990, p. 178). The results are also consistent with the findings of recent studies involving racing (Bruce & Johnson, 1994), and blackjack (Wagenaar, 1988; Walker, Sturevska & Turpie, 1995) which found few significant gender differences in the quality of decision-making.

As Table 7.3 and 7.4 show, the only strong predictor of skill ratings was the participation scores which showed, as might be expected, that people who participated in each activity were more likely to provide higher skill ratings. In this connection, the results confirm previous laboratory findings obtained by Langer (1975), Blascovich, Veach, and Ginsburg (1973), and Ladouceur and Mayrand (1984), Ladouceur et al. (1984), which have shown how increased familiarity with gambling tasks is associated with a greater perception of control and confidence, as measured directly by rating scales, or indirectly by increases in bet-sizes. More generally, the results confirm broader theoretical frameworks (e.g., Bandura, 1977; Rotter, 1966) which assume that task familiarity is positively related to personal efficacy and expectations of success.

(b). *Reasons for Avoiding Skilled Games*

The hypothesis that older people and women avoid skilled activities such as blackjack because of decreased self-efficacy cannot be accurately assessed using the skill ratings. This is because the factors which may maintain, or be involved in, the process of gambling may not be the same as those influencing the decision to gamble (Dickerson, 1989; 1993). Alternatively, this may be because survey studies do not provide an accurate indication of what people really believe when they gamble (Walker, 1992a). Thus, the results presented in Tables 7.5 and 7.6 may be of value. Although the results revealed few effects for age, some interesting results were obtained for gender. Specifically, it was found that over 55% of women who did not gamble on blackjack responded that they avoided the game because it required too much skill and concentration, 46% said that they did not play because of a lack of knowledge concerning the rules, whereas 34% indicated that the presence of other

people was an important reason why they did not play. These percentages were almost twice as large (although not significantly larger than those obtained for the small number of men who answered this question). This lack of significance does not invalidate the following discussion of gender-differences because of the obvious circularity associated with accepting this result. (i.e., If men play blackjack, they will not answer the question. If they do not answer the question, statistical tests will have insufficient power to show that a difference exists. Therefore, as male preference for blackjack increases, the more difficult it will become to reveal motivational differences using this question). Here, the matter of interest was to examine the importance which women ascribed to each explanation.

The finding that 46% of women who did not gamble on blackjack because they did not know the rules is consistent with the theory that gambling preferences are related to differences in socialisation (Abt et al., 1985; Ide-Smith & Lea, 1988). Card games such as poker and blackjack have traditionally been linked with male social groups in both childhood and adolescence (see Griffiths, 1995a for a review). It is logical to assume that this early exposure to these activities during early years of life increases knowledge and interest which is maintained into adulthood, although it remains for this theory to explain why these differences exist at all. Lindgren et al's (1986) notion that women avoid traditionally male activities because they are detached from the 'public world' of male activity seems invalid given that gambling habits are well established before adulthood.[4] However, given that 56% of women also avoided blackjack because it required 'too much skill and concentration', suggests that the nature of the activity is also important.

Women do not appear to enjoy activities which involve skill, concentration, competition or skill, and this is consistent with previous research by Deaux and Emswiller (1974), Deaux et al. (1975), Martinez (1995), Abt and Smith (1984) and Griffiths (1995a), which has suggested that women are less motivated to participate in activities which have traditionally been identified as 'masculine' tasks. Unfortunately, the extent to which these results were influenced by demand characteristics remains unclear. As shown by Nisbett & Wilson (1977), when answering surveys people try to provide responses which seem plausible, sensible and which justify their decisions or

[4] It should be noted that Lindgren et al. (1986) also obtained limited support for this idea.

behaviour. Thus, when women in this survey endorsed these items, it does not necessarily follow that they had considered these explanations before completing the survey. Their responses might have been little more than an ad hoc justification for habits established over many years, or explanations which they felt made sense for the majority of women who gamble.

(c). *Motivational Differences*

Previous research has drawn attention to the numerous reasons which people provide for gambling (e.g., Caldwell, 1974; Chantal et al., 1995; Dickerson et al., 1990; Dumont & Ladouceur, 1990; Griffiths, 1993b; Kallick-Kaufmann, 1979; Moran, 1970b). These reasons have included: gambling to win money, for excitement, a thrill, to try one's luck, to meet friends, to escape boredom or depression. In this study, it was hypothesised that younger people and men would be more likely to gamble to win money, to test their skills and would rate non-monetary motivations as less important. This hypothesis was partially supported. Age was negatively associated with a desire to win money and testing one's skills, and men rated 'testing their skills' as being more important than did women who, in turn, reported that relaxation was a more important reason for gambling than did the men. However, multiple regression analyses showed that when one controlled for differences in participation, no gender and age differences were found. This suggests that it may be difficult to determine the nature of gambling motivations independently of differences in preferences. That is, because men and younger people were more likely to have gambled on skilled activities, they would also be more likely to rate testing their skills and winning money as being more important. Consequently, unless a longitudinal study is conducted, it is unclear whether the motivational factors identified influence the choice of activity, or whether they are merely a consequence of established gambling patterns.

(d). *The Use of Skill and Luck in Gambling*

It was hypothesised that men and women would differ in their use of luck and skill in gambling. Specifically, it was predicted that women would be more likely to emphasise the importance of luck whereas men would emphasise the importance of skill. A second hypothesis was that younger people would be more likely to employ skill than older people. These hypotheses were investigated by asking gamblers to

respond to a short series of questions relating to gambling behaviours associated with luck and skill. As shown by Table 7.9 and 7.10, men were significantly more likely to read books on how to gamble, to attribute their success to skill and to utilise strategies when they gambled, and these effects remained even after participation had been statistically controlled using logistic regression analysis. However, contrary to predictions, beliefs and behaviours relating to the use of luck were equally observed in men and women. Men were just as likely as women to believe that some gamblers are naturally lucky, to use superstitious rituals, or believe in lucky days or numbers. However, associations between age and beliefs concerning the role of skill and luck did not remain significant after controlling for the effects of gender and participation.

Although these results seem inconsistent with the absence of gender differences in the skill ratings presented in Table 7.3 and 7.4, this may be because Table 7.3 and 7.4 and Table 7.10 are concerned with different aspects of gambling behaviour. Specifically, whereas Table 7.3 and 7.4 refers to gamblers' assessments of their ability to influence the outcomes, the items in Table 7.9 relate to whether such attempts were made. Men and women appear to differ very little in their perceptions of gambling activities (e.g., the extent to which skill can be used to influence outcomes), but men appear more likely to attempt to apply skill when they gamble. This adds further support to the argument that gender differences in gambling are more likely to be based upon differences in motivation, rather than differences in ability or cognitions.

More generally, the findings from this series of questions add support to previous studies which have emphasised the role of cognitive factors in gambling behaviour (e.g., Griffiths, 1994; Keren & Wagenaar, 1988; Ladouceur et al., 1984, 1986, 1988, 1991; Langer, 1975; Langer & Roth, 1975; Walker, 1988, 1992b). Superstitious beliefs including a belief in luck, clearly play an important role in the gambling habits of most gamblers. Such beliefs are noticeably more common than such rational behaviour as checking the odds of the games and obtaining information on how to improve performance. In this regard, these results are consistent with previous research by Walker (1992b) and Ladouceur et al. (1988) which has found, using the speaking-aloud method (see Chapter 4), that gamblers tend to express more irrational beliefs (70%) about gambling than rational ones.

Finally, this study shows that these commonly held beliefs about skill and luck are associated with gambling persistence. Although no age or gender differences were observed when participation was controlled, it was found that a large percentage of people in the sample (approximately 50%) responded that losses could be recovered either by playing well or waiting for one's luck to change. Fifty-two percent also emphasised the importance of anticipating a large win as being an important motivation to continue. These findings confirm previous research discussed in Chapter 4, which has suggested that chasing-behaviour (Lesieur, 1984; O'Conner et al., 1995) is likely to be associated with false beliefs about the nature of luck, overestimations of skill and a fear of missing out, or experiencing regret, Loftus & Loftus (1983).

Conclusion

This study adds to the small number which have examined the role of gender and age in gambling. In accordance with Lindgren et al. (1986) and Hraba and Lee (1995), it is concluded that hypothesised gender differences in gambling behaviour (Mark & Lesieur, 1992) may be exaggerated. Differences exist in relation to male and female preferences for gambling activities (see Chapter 5) with men more likely to gamble on casino games and racing, and to discover ways of improving their gambling performance (this Chapter). However, when one controls for differences in participation, men and women do not differ in their motivations for gambling, nor in their perceptions of the activities. They also do not differ in their likelihood of experiencing problems as a result of their gambling (Chapter 6). As Doyle (1985) has argued, this is likely to be linked to changes in society which have negated many of the traditional differences between male and female gender roles. Women can now gamble with less fear of negative appraisal, and can feel more confident about participating in activities which were previously regarded as masculine. Thus, as Hraba and Lee (1995) have suggested, whereas gambling was once considered primarily a male behaviour, and a male problem, it is now also very much a part of the lives of women.

A similar conclusion can be made concerning age differences in gambling behaviour. This study has shown that, although older people typically gamble on a narrower range of activities (i.e., they tend to avoid racing and casino games), they have similar motivations for gambling. For example, older people are just as likely as younger people to regard gambling as a challenge or a way of winning money when one

controls for differences in participation. They are also just as likely to perceive activities as containing the possibility for skilful play, and to believe that they have the skill to influence outcomes. Although not negating Walker's (1992b) point that older people tend to avoid some activities because of decreased cognitive functioning, these findings show that cognitive factors may be more related to the initial decision to gamble rather than the gambling itself. Once elderly people begin participating in a certain activity, their gambling is probably very similar to that of younger participants in terms of how much they bet, the strategies they use, and the importance ascribed to factors such as skill and luck.

Section C

Poker Machine Gambling

Gambling in South Australia

Chapter 8

Study 4: Poker Machine Gambling: a survey study

8.1 General Introduction

In assessing the effects of gambling upon South Australia, it can observed from previous chapters, that certain types of gambling are more likely to be associated with problem gambling than others. Consistent with Dickerson (1984; 1989; 1995), it was found that gambling-related problems were more commonly experienced by regular participants of 'continuous' forms of gambling such as racing and poker machines. In Chapter 6, for example, it was shown that over 90% of people who scored 5 or more points on the SOGS (Lesieur & Blume, 1987) gambled on these activities. It was further shown that, although each activity was equally likely to be associated with gambling problems in relative terms, poker machines were the most important in absolute terms. Approximately sixty percent of gambling problems in South Australia were associated with poker machine gambling. This was attributed to the greater popularity of poker machines which, unlike other continuous activities such as racing and casino games, attract participants from a wider range of demographic groups, including women and the elderly. For these reasons, it was considered of practical and theoretical importance to investigate further the factors contributing to the development and maintenance of this type of gambling. [1]

Poker machines, or fruit machines as they are known in the United Kingdom, have been previously researched by Dickerson et al. (1988, 1991, 1992), Walker (1988, 1992b), and Griffiths (1995a). The findings of this research are summarised in Chapter 4, and these show that considerable advances have been made towards understanding the factors, cognitive, behavioural, arousal, involved in the maintenance of gambling on this activity. This research is continued in the next four chapters of this thesis which describes a series of studies which attempt to apply and extend this work using samples of South Australian poker machine players.

---

[1] Note: The term poker machine is synonymous with the term 'fruit machine' used in the UK. In this study, the term is not extended to encompass electronic card games (e.g., video-poker, etc.) of the nature studied by Ladouceur and his associates, or Walker (1992b).

8.2 Description of Study 1

The first of these studies, contained in this chapter, describes the results of a brief survey relating to people's perceptions of, and motivation for, gambling on poker machines. The data for this study were obtained from a brief survey given to those (n=59) who participated in the studies described in Chapter 10 and 11. The purpose of this study was to examine people's motivations for playing poker machines, general gambling habits, perceptions of skill, and mood states before, during and after gambling. Although replicating some of the analyses presented in Chapter 7, these questions were more specific and related solely to poker machines rather than gambling in general. Several questions in this survey were adopted from Griffiths (1994, 1995a) to allow comparisons with his research on fruit machine players in the United Kingdom. A second aim of this study was to compare the gambling habits of this sample with those in the community gambling survey. This is important because of recent suggestions by Ladouceur, Arsenault, Dube, Freeston and Jacques (1996) that samples of gamblers obtained by public advertisements (as in this study) may not be representative of the population of gamblers in the community.

Motivations for Gambling

Although relatively little research has been conducted to examine why people gamble on poker or fruit machines, the limited data available suggest that people gamble for a multiplicity of reasons (Walker, 1992a, b). These reasons include 'for amusement or excitement' (AGB McNair, 1992, 1995; DBM Consultants, 1995; Caldwell, 1974; Daley, 1987; Dickerson, Fabre & Bayliss, 1986; Dumont & Ladouceur, 1990; Griffiths, 1994b), social interaction (Griffiths, 1993b; Walker, 1992a), winning money (Baudot, 1988; Griffiths, 1993b, DBM Consultants, 1995), to escape boredom, or the chance to win a jackpot (Griffiths, 1995a). The importance ascribed to these motivations has, however, varied from one study to the next. For example, whereas Griffiths (1993b) found that 57% of regular fruit machine players rated winning money as an important motivation for gambling, a Victorian survey by DBM Consultants (1995) obtained a figure of less than 30% for all players of gaming machines.

These survey results have generally been interpreted in the context of the theoretical perspectives outlined in Chapter 4. For example, the fact that players report gambling for excitement has been interpreted in terms of arousal theories outlined by Brown (1986), Anderson and Brown (1984, 1987), Leary and Dickerson (1985) which suggest that players use gambling to increase arousal-levels to a hypothetical optimum. In addition, the finding that people report playing slot machines to escape anxiety, worries or depression (Cocco et al., 1995; Dickerson, 1997) has been interpreted in the context of previous research (e.g., Jacobs, 1986, 1988) suggesting that gambling has a dissociative quality, in that it allows people to escape everyday problems or commitments. Finally, the finding that poker machine players report gambling 'to win money' has been interpreted in relation to previous research by Langer (1975), and Ladouceur et al. (1984, 1986, 1988, 1991) which has found that people tend to over-estimate their likelihood of success on chance-determined tasks.

Perceived Skill in Poker Machine Gambling

The fact that some poker machines gamblers believe they can win money is of particular interest because this is clearly an activity which contains almost no possibility for skilful play (Caldwell, 1974; Stotter, 1980). Apart from pressing buttons, varying bet-sizes, changing the number of payout lines, poker machines involve no complex decisions and offer the player with almost no direct involvement in the game. Publicly, this is a view which is endorsed by most poker machine players. Walker (1988) has, for example, shown that only 23% of players believe that skill is possible and only 20% believe that one can win money by playing. Moreover, these findings were confirmed in the study reported in Chapter 7, which found that only 16% of casino gamblers rated poker machine as involving a moderate to high level of skill.

More recently, however, research conducted by Griffiths in the United Kingdom using samples of adolescent fruit machine players, has obtained results which seem inconsistent with these Australian findings. In Griffiths' study, (e.g., Griffiths, 1994), 60% of regular fruit machine players reported that the activity was 'equal skill/equal chance', with none reporting that the activity was purely determined by chance. Walker (1992a) argues that this difference is attributable to the different structural characteristics of slot machines in the two countries. Slot machines in the UK contain many features which Australian poker machines do not; these include hold buttons

which allow the player to freeze the movement of two reels for the next spin (see definitions provided by Griffiths, 1995), light oscillations and 'gamble buttons'. The inclusion of these features on UK machines appears to increase the players' subjective sense of control making them believe (falsely) that the probability of winning can be significantly increased using skilful play. Thus, according to Walker, because Australian machines do not have features, a comparison of poker machines and UK-style fruit machines may be difficult. Australian players will be less likely to perceive the activity as involving skill, making it difficult to apply Griffiths' results to adult poker machine gambling in Australia. A more valid comparison, Walker (1992a) argues, is to compare Griffiths' results with those for Australian video poker games, since these games also contain 'hold features' which allow players to influence the outcomes.

So far no research has been conducted to examine whether this difference in the structural characteristics of slot machines influences other aspects of gambling behaviour, e.g., people's method of playing, their mood states when playing, their motivations for playing. As a result, it remains unclear the extent to which Griffiths' findings can be applied to Australian adult samples, which is unfortunate given that Griffiths' work forms an important background for this present research project. Therefore, a central aim of Study 1 was to examine whether: (a). perceived differences in skill would emerge when one used the same questions employed by Griffiths, and (b). whether UK fruit machines players and Australian slot machine players could be differentiated on any other aspect of their behaviour.

Mood states and poker/fruit machine gambling

The role of mood and arousal in gambling has been previously discussed in Chapter 4 and, as was concluded, it remains one of the more complex and controversial aspects of gambling research. Although this topic is not a central component of the present investigation, questions relating to mood were included in the present study to allow further analysis of the similarities or differences between South Australian poker machine gamblers and Griffiths' fruit machine players. Consisting of a series of simple self-report items, these questions asked subjects to report how they typically felt before, during and after gambling on fruit/poker machines. Griffiths revealed several interesting trends. Approximately 60% of players

(both occasional and regular) were usually in a good mood when they commenced gambling. During gambling, regular gamblers were more likely than occasional gamblers to experience: excitement (84% vs. 33%), depression (32% vs. 7%) and positive mood states (84% vs. 53%). After gambling, regular gamblers were more likely to experience depression (53% vs. 10%).

Mood states have also been examined in several previous Australian studies by Dickerson et al. (1991, 1992) and Dickerson and Adcock (1987). This research has shown that regular players with negative mood states prior to the onset of gambling, were more likely to persist longer than those with positive moods states. Several explanations were advanced to account for these findings including the reduced habituation of elevated arousal states (Dickerson & Adcock, 1987), and impairments to cognitive functioning (Dickerson et al., 1992). However, as Walker (1992a) points out, neither of these explanations has, as yet, been adequately developed nor researched.

Validation of the Experimental Sample

Finally, because this sample was used in the experimental studies described in Chapter 10 and 11, it was considered important to ascertain that the gambling habits of the volunteer sample were representative of the population of poker machine gamblers in the community. This comparison was prompted by the recent findings of Ladouceur, Arsenault, Dube, Freeston and Jacques (1997), which showed that volunteers obtained in gambling research tend to have significantly higher levels of gambling involvement and gambling-related problems than people in the community. Consequently, it has been suggested that the findings of some studies may not be easily generalised to other gamblers in the community because of this sampling bias. In order to examine this possibility in the present study, the gambling expenditure figures reported by those in the volunteer survey are compared with those obtained in the community survey described in Chapter 5 and 6.

Predictions

Based upon the previous research described above, it was predicted that, in contrast to Griffiths' fruit machine players, South Australian poker machine would be: (a). Significantly less likely to perceive the activity as involving skill and, (b). Less likely to

rate winning money as an important motivation for gambling. On the other hand, because this was the first comparative study which has attempted to apply Griffith's findings in Australia, no predictions were made concerning the other motivational factors identified in this survey. Nor were any predictions made concerning the role of mood states before, during and after gambling.

8.3 Method

8.3.1 Subjects

Subjects were 59 poker machine players (M=23, F=36) recruited by advertisement in a suburban newspaper in metropolitan Adelaide. Of the 59 players, 38 were classified as regular gamblers who played at least once per week, whereas the 21 who gambled less frequently were classified as non-regular gamblers. The 38 regular gamblers consisted of 6 (16%) men and 12 (32%) women aged 18-40 years, and 8 (21%) men and 12 (32%) women aged 41 years or over. The 21 non-regular gamblers consisted of 7 (35%) men and 7 (35%) women aged 18-40 years, and 2 (10%) men and 5 (24%) women aged 41 or more years. Chi-square analyses applied to these data revealed no significant association between age group and the frequency of gambling (regular, occasional), or between gender and age within each group of gamblers (all $\chi 2s(1) < 1$).

8.3.2 Questionnaire

Each respondent was asked to provide details of age (by age-group with 6 year intervals), gender and current gambling habits, including the frequency of gambling, time and money typically spent per session, the largest amount lost and won, and how long they had been playing poker machines. Motivation was assessed by asking subjects to rate the importance of a series of motivations on a five-point scale (1=not important, 3= quite important, 5=very important). There were two questions relating to skill. These were adapted directly from Griffiths (1994, 1995b). The first asked respondents to rate how much skill they believed was involved in playing poker machines (all Chance, mostly chance, half chance/half skill, high skill, all skill). The second asked them to rate their personal skill compared with the average player (totally unskilled, below average, average, above average, totally skilled). The final three questions asked subjects to rate how they typically felt before, during and after

playing poker machines. Options included: good mood, bad mood/angry, excited, depressed/fed up, other). These were adapted from Griffiths (1995b).

8.4 Results

8.4.1 Gambling Involvement

Gender and group comparisons of mean (s.d.) expenditure levels, time spent, the largest sums of money lost or won are presented in Table 8.1. From this table, it can be observed that most gamblers in the sample reported a typical per session expenditure of $20-25, a session length of 1-1.5 hours and reported having obtained largest wins of $300 or more dollars. The largest losses incurred were usually $100 or less. The per session expenditure estimates obtained in this survey were compared with the amounts obtained in a follow up analysis conducted using the data presented in Chapter 5 and 6. This revealed that regular gamblers in the community survey spent $18.0 (s.d.=14.8) per session, whereas the non-regular gamblers spent $13.7 (s.d.=19.9). The amounts reported in this survey were significantly greater than those observed in the community survey: $t(98)=2.68$, $p < .01$ for the regular gamblers and $t(472)=5.64$, $p < .001$ for the non-regular gamblers.

Table 8.1: Gambling involvement in relation to gender and group

		Amount Spent $	Time Spent hrs.	Most Won $	Most Lost $
Overall	(n=59)	24.2 (16.9)	1.5 (1.5)	319.3 (516.5)	79.0 (99.1)
Gender					
Men	(n=23)	20.7 (15.8)	1.4 (1.3)	467.7 (763.9)	107.6(170.5)
Women	(n=36)	26.4 (17.6)	1.6 (1.0)	224.4 (358.3)	60.7 (53.6)
Group					
Non-reg.	(n=21)	19.1 (12.8)	1.1 (0.9)	110.2 (172.4)	39.5 (31.5)
Regular	(n=38)	27.0 (18.5)	1.8 (1.2)	434.8 (660.5)	100.8 (137.6)

Further analyses were undertaken to examine the data in Table 8.1 in relation to gender, group and age. These analyses showed no significant gender differences (all t-values 1.5 or smaller), but showed that regular gamblers had obtained significantly larger wins, $t(57)=2.85$, $p < .01$, sustained larger losses, $t(57)=2.62$, $p < .05$, played

for longer time each session, $t(57)=2.32$, $p < .05$, but did not spent any more than non-regular gamblers in each session, $t(57)=1.73$, $p > .05$. A final analysis using Spearman rho showed that age was unrelated to the amount spent, $rho(57)=-0.10$, $p > .05$, won, $rho(57)=0.03$, $p > .05$ or lost, $rho(57)=-0.10$, $p > .05$, on poker machines.

Previous experience with poker machines

Analysis of the respondents' previous experience with poker machines showed that 71% had gambled for three or more years, 25% had gambled for 1-2 years, with two having only started gambling during the previous 3 months. There was no significant association between group membership, gender and gambling experience ($\chi2(2)=2.58$, $p > .05$, for group and $\chi2(2)=4.14$, $p > .05$, for gender), but experience was correlated with age-group, $rho(57)=0.35$, $p < .01$, with greater experience reported by older age groups. [2]

8.4.2 Motivations for Gambling

The list of motivations contained in the survey is provided in Table 8.2 along with gender and age comparisons. As can be observed, the most important reasons given for gambling on poker machines were 'for the enjoyment or excitement' and the hope of winning money. Less importance was ascribed to such factors as escaping boredom, depression or worry, socialisation or testing one's skills. There were no significant gender differences for these motivational factors (all t-values < 1, except for boredom where $t(57)=1.22$, $p > .05$). There were also no significant group differences (all t-values < 1, except for luck, $t(57)=1.15$, $p > .05$, and winning money, $t(57)=1.95$, $p > .05$). However, motivational factors were significantly associated with age. Younger age groups were significantly more likely to gamble to win money, $rho(57)=-0.51$, $p < .001$, to escape boredom, $rho(57)=-0.45$, $p < .001$, and to escape worry, $rho(57)=-0.27$, $p < .05$. All other correlations were non-significant and less than 0.20.

[2] It was not possible to use chi-square tests using the original survey categories because of violations of the minimum expected frequency assumption. Thus, responses (1-5) corresponding to 1 month to 2 years were combined and compared with response 6 (3-4 years), and response 7 (5 or more years).

Table 8.2 Mean (s.d.) Motivations for playing poker machines in South Australia

Motivation	Overall (n=59)	Men (n=23)	Women (n=36)	Non-Regular (n=21)	Regular (n=38)
Win money	3.4 (1.4)	3.1(1.3)	3.5 (1.4)	3.8(1.2)	3.1(1.4)
Enjoyment	3.8 (1.2)	4.0(1.1)	3.8 (1.2)	3.7(1.2)	3.9(1.2)
Excitement	3.1 (1.3)	3.2(1.3)	3.0 (1.3)	3.1(1.0)	3.1(1.4)
Try Luck	3.1 (1.4)	3.3(1.6)	3.0 (1.3)	3.4(1.4)	2.9(1.4)
Test Skills	1.8 (1.2)	1.9(1.5)	1.8 (1.1)	1.8(1.3)	1.8(1.2)
Boredom	2.2 (1.4)	1.9(1.4)	2.4 (1.4)	2.4(1.4)	2.2(1.4)
Worry	1.6 (1.0)	1.5(0.9)	1.7 (1.2)	1.3(0.6)	1.8(1.3)
Depression	1.8 (1.2)	1.8(1.3)	1.8 (1.2)	1.8(1.2)	1.8(1.2)
Social	1.8 (1.3)	1.7(1.3)	1.9 (1.3)	1.7(1.2)	1.9(1.3)

A second analysis examined the percentage of people rating each motivation as quite important to very important (score range=3-5). These percentages are presented in Table 8.3. This analysis revealed that enjoyment, excitement, winning money and trying one's luck were rated important by over 75% of respondents, whereas only approximately a third or less considered escaping worry, depression, or boredom to be as important. There was no significant association between gender and motivation (all $\chi 2(1) < 1$, or $p > .05$ for Fisher Exact analyses). Regular gamblers were more likely than non-regular gamblers to rate escaping from worry as being important (Fisher Exact, $p < .001$). However, no other significant associations were observed (all $\chi 2s(1) < 2$, or $p > .05$ for Fisher Exact analyses).

The figures in Table 8.3 were compared with those of Griffiths (1993b). In his study, responses were obtained using two open-ended questions. Regular players were asked to indicate why they were attracted to playing fruit machines, whereas non-regular players were asked to report their perceptions of why some people become regular players. Although these questions are not entirely consistent with those in the present study, an approximate comparison is still possible for the regular players. The motivational factors which emerged in both studies are presented in Table 8.4 and were compared using chi-square tests and Fisher Exact tests, (i.e., where chi-square analyses were invalid because of insufficient cases).

Table 8.3 Number (%) of people rating each motivational factor as quite important (score=3) to very important (score=5)

	Overall	Men	Women	Non-Regular	Regular
	(n=59)	(n=23)	(n=36)	(n=21)	(n=38)
Motivation	n %	n (%)	n (%)	n (%)	n (%)
Win money	46 (78)	16 (70)	30 (83)	19 (90)	27 (71)
Enjoyment	54 (90)	22 (96)	32 (89)	18 (86)	35 (92)
Excitement	44 (75)	17 (74)	27 (75)	17 (81)	27 (71)
Try Luck	42 (71)	15 (65)	27 (75)	16 (76)	26 (68)
Test Skills	15 (25)	5 (22)	10 (28)	5 (24)	10 (26)
Boredom	23 (39)	7 (30)	16 (44)	8 (38)	15 (39)
Worry	10 (17)	3 (13)	7 (19)	1 (5)	9 (24)
Depression	15 (25)	4 (17)	11 (31)	5 (24)	10 (26)
Social	18 (31)	6 (26)	12 (33)	5 (24)	13 (34)

These analyses revealed few significant differences between the motivations reported by both samples. The regular poker machine players were significantly more likely to report gambling for enjoyment, $\chi 2(1)=4.83$, $p < .05$, but no other significant results were obtained (all $\chi 2s(1) < 2$, or Fisher Exact probabilities $> .05$).

Table 8.4 Comparison of motivations of South Australian poker machine players and fruit-machine players in the UK (Griffiths, 1994d)

	Regular		Non-regular	
Motivation	Griffiths	S.A. Data	Griffiths†	S.A. Data
	(n=30)	(n=38)	(n=30)	(n=21)
	n (%)	n (%)	n (%)	n (%)
To win money	17 (57)	12 (61)	10 (33)	10 (43)
Enjoyment	10 (33)	24 (67)	3 (10)	13 (56)
Excitement	10 (33)	15 (42)	7 (23)	8 (35)
Skill	4 (13)	3 (8)	3 (10)	3 (13)
Boredom	11 (37)	7 (19)	8 (27)	5 (22)
Worry/Depression	8 (27)	8 (22)	6 (27)	2 (9)
Social	6 (20)	5 (14)	2 (7)	2 (9)

† These figures refer to the reasons given by non-regular gamblers to explain why some people become regular fruit machine players.

8.4.3 Perceived Skill in Poker machine Gambling

The distribution of responses to the first skill question 'How much skill do you think is involved in playing poker machines?' is shown in Table 8.5a along with group and gender comparisons. The figures show that most people in the sample regard poker machines as involving very little skill or no skill. Chi-square analyses of the 'all chance', 'mostly chance' data revealed no significant gender (all $\chi 2(1) < 1$) or group differences ($\chi 2(1)=3.63$, $p > .05$. for the 'all chance' ratings, $\chi 2(1)=2.25$, $p > .05$, for the 'mostly chance' ratings). Finally, Spearman correlations (using the skill ratings as an ordinal scale) showed that these ratings were unrelated to age ($rho(57)=-0.09$, $p > .05$).

A second analysis examined the results of the second skill question 'How skilful do you think you are compared with the average person?'. The results are shown in Table 8.5b. This analysis also revealed no significant gender or group differences (all $\chi 2s(1) < 1$) except for average skill ratings, $\chi 2(1)=2.07$, $p > .05$, for regular players, $\chi 2(1)=3.35$, $p > .05$, for non-regular players). Once again there was no significant relationship between skill ratings and age, $rho(57)=-0.09$, $p > .05$.

Table 8.5a Perceived skill ratings for poker machine gamblers in South Australia

	Overall	Men	Women	Non-Regular	Regular
	(n=59)	(n=23)	(n=36)	(n=21)	(n=38)
Rating	n %	n (%)	n (%)	n (%)	n (%)
All Chance	31 (53)	11 (48)	20 (56)	7 (30)	24 (67)
Mostly Chance	22 (37)	10 (43)	12 (33)	11 (52)	11 (29)
Equal Skill/Chance	5 (8)	2 (9)	3 (8)	2 (10)	3 (8)
Mostly Skill	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Skill	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Another series of analyses compared the results obtained in the present study with the ratings obtained by Griffiths (1994). A comparison of perceived skill ratings is provided in Table 8.6. Inspection of these results, and statistical analyses, showed that regular poker machine players were significantly more likely to rate the activity as 'all

chance' (Fisher Exact, $p < .001$), but were less likely to rate the activity as equal chance/equal skill, $\chi 2(1)=19.0$, $p < .001$. A similar trend was observed in the non-regular gamblers with South Australian gamblers more likely to rate the activity as 'all chance' (Fisher Exact, $p < .05$). Fruit machine players were more likely than the poker machine players to perceive the activity as involving an element of skill.

Table 8.5b Perceived personal skill compared with other South Australian players

	Overall	Men	Women	Non-Regular	Regular
	(n=59)	(n=23)	(n=36)	(n=21)	(n=38)
Rating	n %	n (%)	n (%)	n (%)	n (%)
Totally Unskilled	11 (19)	6 (26)	5 (14)	5 (24)	6 (16)
Below Average	5 (8)	3 (13)	2 (6)	3 (14)	2 (5)
Average	41 (69)	13 (56)	28 (78)	11 (52)	30 (79)
Above Average	1 (2)	1 (4)	0 (0)	1 (5)	1 (3)
Totally Skilled	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

This trend was even more strongly observed in the comparison of personal skill ratings (Table 8.7). Regular poker machine players were significantly more likely to rate themselves as totally unskilled (Fisher Exact, $p < .05$), or of average ability, $\chi 2(1)=17.7$, $p <.001$ compared to UK fruit machine players.

Table 8.6 Comparison of perceived skill ratings of South Australian poker machine players and UK Fruit-machine players (Griffiths, 1994)

	Regular		Non-regular	
Motivation	Griffiths	S.A. Data	Griffiths	S.A. Data
	(n=30)	(n=38)	(n=30)	(n=21)
	n (%)	n (%)	n (%)	n (%)
All Chance	0 (0)	24 (67)	3 (10)	7 (30)
Mostly Chance	10 (33)	11 (31)	19 (63)	11 (47)
Equal Chance/Skill	18 (60)	3 (8)	7 (23)	2 (9)
Mostly Skill	1 (3)	0 (0)	1 (3)	0 (0)
All Skill	1 (3)	0 (0)	0 (0)	0 (0)

Table 8.7 Comparison of personal skill ratings of South Australian poker machine players and UK Fruit-machine players (Griffiths, 1994)

	Regular		Non-regular	
Motivation	Griffiths	S.A. Data	Griffiths	S.A. Data
	(n=30)	(n=38)	(n=30)	(n=21)
	n (%)	n (%)	n (%)	n (%)
Totally Unskilled	0 (0)	6 (17)	12 (40)	5 (22)
Below Average	0 (0)	2 (6)	7 (23)	3 (13)
Average	7 (23)	30 (83)	10 (33)	11 (48)
Above Average	18 (60)	0 (0)	1 (3)	1 (0)
Totally Skilled	1 (3)	0 (0)	0 (0)	0 (0)

8.4.4 Mood States Associated with Playing Poker/Fruit Machines

Table 8.8 shows results of the question which asked people to report how they felt before, during and after playing poker machines. Chi-square analyses revealed no significant associations between moods states and gender or gambling frequency (all $\chi 2(1)$s < 1, except the group comparison for good mood during play where $\chi 2(1)=1.65$, $p > .05$). Mood states were also unrelated to age-group (all rhos(57) $< .10$). Overall, most players reported being in a good mood before, during and after playing, but were more likely to experience excitement while playing rather than before or after they played. This was confirmed using Cochran's Q test for k related samples (Siegel, 1988), which showed that the probability of a positive or 'yes' response for excitement was significantly higher in the second question relating to within (or during) session mood-states, $Q(2)=146.5$, $p < .001$. A second Cochran's test showed that players were more likely to feel depressed after having played than before or during a session, $Q(2)=13.3$, $p < .01$. However, no significant differences were observed for 'good' or 'bad/angry' mood states, $Q(2) < 1$.

A final analysis compared the results obtained in this study with those obtained by Griffiths (1994). Table 8.9 shows that the pattern of mood states reported by Griffiths' fruit machine players was similar to that observed in the South Australian poker machines players. Good moods were experienced during all 3 time periods (before,

during and after); excitement was more likely to be experienced during sessions; whereas depression was more likely to be experienced after sessions.

Table 8.8 Moods experienced by South Australian poker machine players before, during and after gambling (Question allowed multiple response)

	Overall	Men	Women	Non-Regular	Regular
	(n=59)	(n=23)	(n=36)	(n=21)	(n=38)
Before	n %	n (%)	n (%)	n (%)	n (%)
Good Mood	40 (68)	14 (61)	26 (36)	13 (61)	26 (68)
Bad Mood/angry	1 (2)	0 (13)	1 (3)	0 (0)	1 (3)
Excited	16 (27)	7 (30)	9 (25)	5 (24)	11 (29)
Depressed/fed up	2 (3)	0 (0)	1 (5)	0 (0)	0 (0)
During					
Good Mood	37 (63)	5 (14)	5 (24)	11 (52)	26 (68)
Bad Mood/angry	5 (8)	3 (13)	2 (6)	2 (10)	3 (8)
Excited	23 (39)	10 (43)	13 (36)	11 (52)	12 (32)
Depressed/fed up	6 (10)	1 (4)	0 (0)	1 (5)	1 (3)
After					
Good Mood	33 (56)	11 (48)	22 (61)	10 (48)	23 (64)
Bad Mood/angry	6 (10)	3 (13)	3 (8)	3 (14)	3 (8)
Excited	6 (10)	4 (17)	2 (6)	4 (19)	2 (6)
Depressed/fed up	13 (22)	5 (21)	8 (22)	5 (24)	8 (22)

Comparison of the two samples of regular gamblers in Table 8.9 showed no significant differences in mood states prior to gambling (all $\chi 2$s(1) < 1, or Fisher Exact, $p > .05$). However, Griffiths' regular fruit machine players were significantly more likely to feel excited (84% vs. 32%, $\chi 2(1)=12.03$, $p < .01$) and depressed (32% vs. 3%, $p < .01$, Fisher Exact Test) during gambling sessions. On the other hand, there were no significant differences between the two samples in relation to mood states experienced after gambling, although the comparison for good mood states was close to significance, $\chi 2(1)=3.3$, $p < .10$.

Table 8.9 Comparison of mood ratings for South Australian poker machine players and UK Fruit-machine players (Griffiths, 1994d)

	Regular		Non-regular	
Motivation	Griffiths	S.A. Data	Griffiths	S.A. Data
	(n=19)	(n=38)	(n=30)	(n=21)
Before	n %	n (%)	n (%)	n (%)
Good Mood	12 (63)	26 (68)	18 (60)	13 (61)
Bad Mood/angry	5 (1)	1 (3)	1 (3)	0 (0)
Excited	6 (31)	11 (29)	17 (57)	5 (24)
Depressed/fed up	0 (0)	0 (0)	2 (7)	0 (0)
During				
Good Mood	13 (68)	26 (68)	13 (43)	11 (52)
Bad Mood/angry	4 (21)	3 (8)	1 (3)	2 (10)
Excited	16 (84)	12 (32)	10 (33)	11 (52)
Depressed/fed up	6 (32)	1 (3)	2 (7)	1 (5)
After				
Good Mood	16 (84)	23 (64)	16 (53)	10 (48)
Bad Mood/angry	5 (26)	3 (8)	1 (3)	3 (14)
Excited	3 (16)	2 (6)	7 (23)	4 (19)
Depressed/fed up	10 (53)	8 (22)	3 (10)	5 (24)

By contrast, the results for the two samples of non-regular gamblers were very similar. Griffiths' fruit machine players were significantly more likely to feel excited before they started gambling (57% vs. 24%, $\chi 2(1)=4.18$, $p < .05$), but all other comparisons were non-significant ($\chi 2s(1) < 2$ or Fisher Exact, $p > .05$).

8.5 Discussion

The results in this study confirmed the hypothesis that fruit machines in the United Kingdom would be perceived differently from Australian poker machines. Adolescent fruit machine players are significantly more likely to believe in the possibility of skilful play, whereas the vast majority of poker machine players believe that outcomes are

entirely due to chance. These findings are consistent with those of Walker (1992b), who, as noted earlier, argues that UK-style fruit machines have more in common with Australian video-card games such as video-poker. This is because unlike poker machines which only allow changes in bet sizes and number of lines, fruit machines and video poker have a small decision-making component which may give rise to a greater illusion of control, encouraging players to believe that they can improve their performance using strategies. This suggests that findings of cognitive studies of fruit machine gamblers may not be entirely generalisable to Australian poker machine gamblers, particularly when one examines the nature of the cognitions. Nevertheless, Griffith's and Walker's findings both support the general notion that erroneous beliefs concerning the possibility of skilful playing-styles may be an important factor in the maintenance of slot machine gambling, and a possible target for intervention strategies (Griffiths, 1995a).

On the other hand, an analysis of responses to the motivational responses showed that both samples have similar motivations for gambling. Although regular poker machine players were significantly more likely to gamble 'for the enjoyment', both groups rated this motivation and the desire 'to win money' as the two most important motivations, with 'for the excitement' ranked third. These results are consistent with previous research by Caldwell (1974), Dickerson et al. (1994), and Dumont and Ladcouceur (1990) which has revealed a similar pattern of motivations in players of both poker machines and video card games. Furthermore, the results are consistent with the findings in Chapter 7, which showed that motivations for gambling are generally unrelated to sex. However, these results contrast with recent results obtained in Australia by Loughman, Pierce, and Sagris (1996) using the G-MAP (an 85-item measure of gambling motivation) which found that male poker machine players were more likely than female players to gamble to make money, and to attempt to exert control over the outcomes. This latter discrepancy could be because Loughman et al.'s did not draw any distinction between spinning-reel slot machines and video card games. The latter class of activities is preferred by males, and differs from the former in that a small element of skill or control is possible (Walker, 1992a).

This study also revealed a number of differences in the motivations of regular and occasional players. For example, regular players were significantly more likely to

gamble to escape from worry (24% vs. 5%), which is consistent with previous research by Anderson & Brown (1984, 1987), Blaszczynski et al. (1990), and McCormick (1987) which has found that people use gambling to reduce anxiety and other negative mood states. It is also consistent with the theory propounded by Jacobs (1986, 1988), namely, that gambling provides a form of psychological escape from the drudgery, monotony and unpleasantness of everyday life. Interestingly, this trend was most strongly observed in younger gamblers, suggesting that younger gamblers may be more psychologically dependent upon gambling than older ones.

Overall, responses to the mood questions showed that poker machine players typically experienced positive mood states before, during and after gambling sessions, whereas negative mood states such as depression were usually experienced at the end of sessions. This contrasts with the results obtained by Griffiths (1995b), who found that fruit machine players usually experience depression *during* gambling sessions. By contrast, the results seem more consistent with research by Wray and Dickerson (1981) which has shown that many gamblers experience withdrawal symptoms when they cease gambling. However, in this study, it seems unlikely that these symptoms were related to any form of physiological dependence, but rather to the frustration and disappointment associated with losing money. In this regard, the present results are inconsistent with theories which suggest that people gamble in order to relieve depressive symptoms. It is suggested instead that people's mood states vary according to the outcome of the game. If players win, they feel excited and happy; on the other hand if they lose, they feel depressed. Thus, according to this view, it is logical to expect a fluctuation in mood during the same session, and from one session to the next. Indeed, it may be that the greater incidence of negative symptoms in regular gamblers is the result of these people experiencing heavy losses more frequently than occasional gamblers.

The fact that regular South Australian players were less likely to experience negative mood states or excitement during gambling (i.e., compared with fruit machine players) is interesting, and suggests a need for further research which compares adult and adolescent gamblers. One theory which could be tested is that these differences in mood states may reflect differences in the motivations of older and younger gamblers. That is, because younger people are more likely to gamble to win money, their

affective reactions to gambling will be more strongly related to the outcomes.[3] Thus, younger people will be more likely to experience strong positive emotions such as euphoria or excitement when they win, and strong negative emotions such as depression and disappointment when they lose. Moreover, because fruit machines are likely to be associated with an increased expectation of winning because of the inclusion of certain 'pseudo-skill features' (Griffiths, 1995a), fruit machine-players may be more likely to experience stronger emotions than poker machine players.

A further explanation for this difference may be that the two samples (i.e., the present sample and Griffiths' fruit machine players) were not exactly matched in terms of gambling involvement. While both samples contained people who gambled with a similar frequency, the regular gamblers in one study, namely Griffiths', might have gambled significantly more heavily than the other, and been experiencing greater difficulties. This may have reduced the likelihood of negative symptoms being observed in the South Australian sample. Unfortunately, because expenditure and/or diagnostic questions were not included in both studies, this comparison cannot be made. However, as discussed below, it is likely that differences in involvement are unlikely to account for the differences between the two studies. This is because an analysis of the per session expenditure for the poker machine players showed that these people spent significantly more than the poker machine players identified in the community gambling survey (CSG). Thus, it is unlikely that the present sample contained an over-representation of regular gamblers who gambled less heavily. On the contrary, consistent with the recent findings of Ladouceur et al. (1997), it was found that this sample of regular gamblers, recruited by a public advertisement, gambled more heavily than those who were randomly selected in the CSG. Therefore, the difference is more likely to be related to the age difference between the samples and/or the nature of the activity. The latter seems most likely because while the youngest gamblers in the present study were of a similar age to Griffiths' subjects, their responses were different.

---

[3] Note: Although Table 8.4 shows no significant group difference between the percentage of regular players who endorsed this question, these data may be misleading in that Griffiths did not provide a rating scale to measure the relative importance of this motivation for his players. Based upon the findings in Chapter 7, it is possible that this motivation may have been more strongly endorsed by his younger sample of players.

Conclusions

The purpose of this study was to investigate the role of motivation, mood states and perceived skill in poker machine gambling, and also the extent to which previous research conducted in the United Kindgom by Griffiths can be generalised to South Australia. The results obtained revealed a few differences between the two sample groups. Although South Australian gamblers were significantly less likely to perceive slot machines as involving skill, and were also less likely to experience negative mood states during gambling, they reported similar motivations for gambling and reported a similar range of emotions before, during and after gambling. The differences observed were attributed to motivational factors which included: the stronger motivation to win money observed in younger gamblers, and also the different structural characteristics of UK-style slot machines which increase the player's expectation of winning through the use of skilful playing strategies.

Chapter 9

Study 5: Within-Session Characteristics of Poker Machine Gambling (a laboratory study)

9.1 Overview

Although survey studies of poker machine gambling can provide considerable information concerning the characteristics of poker machine gamblers, such studies may provide relatively little information relating to the nature of the behaviour itself. This is because responses obtained in survey studies may not be indicative of what occurs when people gamble. As Walker (1992a) observes, responses in surveys may be unintentionally inaccurate because people cannot remember what usually happens when they gamble (c.f., Ericsson & Simon, 1981; Nisbett & Wilson, 1977; Kahneman & Tversky, 1984), affected by socially desirable responding, or else deliberately misleading because of gamblers' reluctance to provide personal information to strangers. For example, as Walker (1992a) points out, the fact that most Australian poker machine players describe this activity as involving no skill may be the result of the second type of response bias. Such a response is only provided because the person knows that this is the correct and most rational answer to provide.

For these reasons, recent gambling research and, in particular, research into slot machine gambling has increasingly focussed upon *in vivo* gambling behaviour (Dickerson et al., 1988, 1991, 1992; Dickerson & Adcock, 1987; Griffiths, 1993b, 1994; Ladocouer et al., 1991; Leary & Dickerson, 1985; Walker, 1988, 1990). This research is based upon two assumptions. The first is that the factors involved in the maintenance of slot machine gambling may not be the same as those (e.g., mood states and motivations) which lead to the onset of a gambling session (Dickerson, 1989, 1993). The second is that researchers can only understand the nature of gambling, by studying the behaviour in ecologically valid or realistic gambling settings (Dickerson, 1989; Walker, 1992a).

Within this research, three general theoretical frameworks have been applied to the study of *in vivo* poker machine gambling. Previously reviewed in Chapter 4, these include theories of arousal (Dickerson et al., 1991, 1992; Dickerson & Adcock, 1987;

Griffiths, 1993b; Leary & Dickerson, 1985; Ladouceur et al., 1991); operant conditioning or learning theory (Dickerson et al., 1991, 1992); and cognitive theories (Griffiths, 1994; Walker, 1988, 1992b).

Arousal theories are based upon the assumption that gambling provides a source of excitement and stimulation (Anderson & Brown, 1984; Brown, 1986, 1987). It is hypothesised that, the complex stimuli associated with the gambling environment, the process of risk-taking and the experience of winning, releases tension, creates feelings or euphoria and increases physiological arousal. Arousal has also featured prominently in the recent DSM-IV classification of pathological gambling where it has been considered a central component of the addiction process (Dickerson, 1989; Lesieur & Rosenthal, 1991). Evidence supporting the role of arousal in slot machine gambling has generally proved unconvincing, however. Although Griffiths (1994), Leary and Dickerson (1985), and Dickerson and Adcock (1987) have observed significant heart-rate increases in regular players during gambling, other studies (e.g., Coulombe et al.,1992; Dickerson et al.,1991, 1992) observed minimal increases in physiological arousal following the onset of gambling sessions, and found little association between arousal measures and other aspects of the game, including response rates and the frequency of reinforcement. Furthermore, few differences have been observed between the pre-session and within session arousal responses of regular versus non-regular gamblers (Coulombe et al., 1992; Dickerson et al., 1990; Griffiths (1993b). In fact as shown by Blaszczynski et al. (1986), Dickerson et al. (1990), and Dickerson and Adcock (1987), regular gamblers tend to score lower on measures of sensation-seeking than established norms.

More promising results, however, have been obtained through the application of behaviourist principles to slot machine gambling. Based upon Ferster and Skinner's (1953) and Skinner's (1967) assertion that gambling is maintained by intermittent schedules of reinforcement, Dickerson et al. (1991, 1992) have obtained evidence to support the applicability of learning principles in slot machine gambling. Using direct observation techniques in poker machine venues, it has been found that gambling responses, particularly those of regular players, are sensitive to the nature of machine events. Small wins increase response-rates above base-line levels associated with zero reinforcement, whereas large wins appear to disrupt response patterns. From this,

Dickerson (1993) and Dickerson et al (1992) has concluded that increased involvement in poker machine gambling leads to the development of stereotyped response patterns and 'impaired control', whereby the behaviour of regular players becomes increasingly dictated by factors beyond their control. A problem with Dickerson's studies, however, is that observed changes in response rates cannot be unambiguously attributed to variations in reinforcement. As Walker (1992a) notes, this is because players were asked to pause after each large win to fill out subjective several visual analogue scales, a process which itself may have led to the disruption or alteration in subsequent response rates. Thus, Walker has suggested that Dickerson's findings may need to be re-examined without experimenter intrusion, so that the stereotyped response patterns can be more clearly interpreted.

Promising results have also emerged from studies involving the application of cognitive principles to slot machine gambling (e.g., Griffiths, 1994; Ladouceur et al., 1991; Walker, 1988, 1992b). According to this perspective, gambling behaviour is maintained by erroneous beliefs concerning the role of skill in gambling, the ability to predict the outcomes, and irrational belief in luck and superstitious rituals. Consistent with this view have been studies using the so-called 'speaking aloud technique', which have shown that 70% of verbalisations produced by players during gambling sessions are irrational. It has been suggested by Walker (1992b) that gambling, particularly on games of pure chance, might be maintained by certain core beliefs, for example, one is somehow luckier, privileged or more astute than other gamblers. In other words, whereas most poker machine players privately concede that the activity involves no skill (see Chapter 7 and 8), they nonetheless believe that 'someone must win' and that, through persistence, they will eventually be rewarded.

Cognitive studies (e.g., Griffiths, 1994) have also suggested that irrational-thinking in poker machine players may be linked to common information-processing biases (c.f., Corney & Cummings, 1985; Kahneman et al. 1982; Wagenaar, 1988). These biases include the representativeness bias or gambler's fallacy (Corney & Cummings, 1985; Kahneman & Tversky, 1972), the notion that short-run sequences of events should reflect the characteristics of long-run sequences, availability (Corney & Cummings, 1985), assessments of the probability of future outcomes based upon the salience of previous outcomes, the illusion of control (Langer, 1975; Ladouceur et al., 1984,

1986, 1988), the overestimation of one's ability to influence outcomes, biased attributions (Gilovich, 1983; Gilovich & Douglas, 1986), the attribution of positive outcomes to one's ability and failures to external factors, 1986); and finally, the simulation heuristic (Kahneman et al., 1982; Kahneman & Tversky, 1984; Kahneman & Miller, 1986; Kahneman, Knetsch, & Thaler, 1990), which refers to the tendency to imagine how certain outcomes might have eventuated if different courses of action had been taken.

Cognitive biases have been observed by Griffiths (1994) and Walker (1992b) in studies of irrational thinking in slot machine players. Unfortunately, as Griffiths notes, it has proved difficult to ascertain the exact circumstances under which a particular heuristic will be used. General observations of slot machine players suggests that players do not apply heuristics consistently. That is, it is not uncommon for players to use the same heuristic in different circumstances, or else apply different heuristics to the same situation. However, very few, if any, studies have been conducted to confirm this observation through the systematic observation of specific heuristics in relation to specific machine events or situational factors (Corney & Cummings, 1985). In other words, although the irrationality of gambling-related cognitions is now well documented, the challenge is to determine whether, and in what way specific cognitions are related to gambling behaviour.

9.2 Rationale of Poker machine Study 2

This present study had three objectives. The first was to re-examine Dickerson et al's (1991, 1992) finding that response-rates are sensitive to the nature of gambling outcomes using a methodology that did not require subjects to pause to answer questions at specific points in the game. This was achieved by asking subjects to speak aloud their expectancy of winning during the game, but not specifically after large or small wins. It was hoped that this technique would allow a clearer interpretation of player responses to variations in the frequency of reinforcement that was not confounded by experimenter interference. Based upon Dickerson et al.'s results, it was hypothesised that play-rates would be slowest in intervals containing larger wins and those with no wins, but faster in intervals containing small wins.

The second aim of this study was to examine the role of heuristics and cognitive biases. Whereas previous research has given particular attention to the illusion of control (Ladouceur et al., 1984, 1986, 1988; Langer, 1975; Langer & Roth, 1975) and biased attributions (Gilovich, 1983; Gilovich & Douglas, 1986), the present study considered the role of two neglected biases: availability and representativeness (Corney & Cummings, 1985). This choice was based upon previous findings by Griffiths (1994) Walker (1988, 1992b) and the results in Chapter 7 which suggested that false beliefs concerning the players' ability to predict outcomes may play an important role in the maintenance of slot-machine gambling. In particular, it was argued that biased cognitions based upon notions of 'availability' and 'representativeness' (Tversky et al., 1982) may be commonly employed by regular players.

Anecdotal evidence for the use of the 'availability bias' has been provided by Caldwell (1974), Walker (1988), who have observed that gamblers' choice of machine at a gambling venue is often determined by a process of sampling. Players commonly place coins into a number of machines and, based upon a few outcomes, determine their likely chances of success on each machine. Those machines which pay out wins in this short period are colloquially described as 'hot', whereas those which pay out few wins are described as 'hungry' or 'cold'. Therefore, the successful player is the one who can distinguish the 'hot', or paying machines, from the cold ones.

Similarly, use of the representativeness bias has also been inferred from the behaviour and statements made by gamblers. Implicit in the well documented 'gamblers' fallacy' described in Chapter 4, this bias stimulates the expectation that winning and losing occur in 'periods' or 'steaks'. Gamblers believe that losing streaks will eventually be offset by larger payouts so as to maintain a hypothesised average rate of return, whereas large wins will be followed by losses. This leads to the development of several false, and sometimes undesirable behaviours documented by Walker (1988). They include: (a). Waiting for other players to put a large amount of money into a machine to 'warm it up', (b). Persisting with a prolonged losing streak in the belief that a win will eventually occur, (c). Refusing to allow other players to play a machine on which one has played for some time because of the possibility that they might 'steal the jackpot'. Walker (1992b) has argued that these practices may be central to the

maintenance of excessive gambling behaviour. However, no research has so far attempted to obtain experimental evidence to verify these observations.

In this study, these cognitive biases are examined using subjective ratings of the likelihood of the machine paying out a satisfactory win in a specified number of trials. A similar measure has previously been used by Dickerson et al. (1991, 1992), who asked players, every five minutes, or after each large win to rate their expectancy that the machine would pay out. In Dickerson et al.'s study, it was found that expectancy ratings were unrelated to response rates or the magnitude of wins. However, as noted in Chapter 4, this measure has been criticised by Walker (1992a) as being too unrefined or infrequent for a valid data analysis to be undertaken. For example, many of Dickerson's subjects only played for 15-20 minutes, meaning that only five or six ratings were obtained. This was clearly insufficient for most parametric statistical analyses, and ignored the fact that expectancies might have changed considerably within each of the five minute intervals. Thus, in this present study, players were asked to speaking-aloud expectancies of winning at intervals of no more than thirty seconds. A second criticism of Dickerson's measure was the use of the term 'pay-out'. Many players might have interpreted this as meaning 'jackpot', or a very large win. Because most experienced players know that such large wins occur very infrequently, it is not surprising that their expectancies varied relatively little throughout the session. Accordingly, in the present study, players were asked to specify in advantage what they believe to be a satisfactory payout or win; in this way, an approximate operational definition of 'payout' or 'good-sized win' could be obtained.

A further difficulty was determining an objective or statistical criterion that would detect the use of each bias. To this end, the notions of negative and positive recency were adopted. As described in Chapter 4, recency effects refer to changes in people's tendency to predict a particular outcome (e.g., A) following the occurrence of its binary alternative (Event B) (see Cohen, 1972; Winefield, 1962 for reviews of this research). Negative recency occurs when the expectation of A increases following the occurrence of B, whereas positive recency refers to the reverse situation where A is seen as more probable given the prior occurrence of A.

According to this view, a belief in the gambler's fallacy or belief in the non-independence of events should increase the likelihood of negative recency. If people

believe that a sequence of events, e.g., wins and losses on a poker machine, should be representative of long-term sequences, it follows that the occurrence of a long series of losses should increase expectations of winning. Thus, negative recency in the form of an increased expectation of winning following a series of poor returns or losses, or, a reduced probability of winning following larger wins, should be expected. On the other hand, a use of the availability heuristic should lead to the development of positive recency. People who believe that machines have 'hot' or 'cold' periods, it is hypothesised will increase their expectations of winning following the occurrence of wins, but will decrease their expectations of winning following losses.

It is important to recognise that this application of negative and positive recency to the study of heuristics is not entirely unproblematic. This is because negative recency does not imply a belief in the gamblers fallacy (Cohen, 1972, Winefield, 1962, 1966). People may decrease their expectation of event A occurring (e.g., a win) because these events are seen as less likely (or 'rarer') rather than because of beliefs concerning the non-independence of events. Therefore, the results in this study will be open to more than one interpretation. Nevertheless, it is of theoretical interest to ascertain whether people's expectation of winning are sensitive to the pattern of outcomes. Chapter 11 describes a fourth study which uses the 'speaking aloud' method to study the use of heuristics and biases in regular players, which may further elucidate the cognitive processes underlying variations in expectancies.

Finally, a third purpose of this study was to examine the relationship between expectancy ratings and behaviour. It was hypothesised that, if expectancies of winning are related to behavioural persistence, players should increase their rate of response in relation to increased expectations of winning, whereas response rates should be associated with decreases in expectancy.

9.3 Method

9.3.1 Subjects

Twenty three undergraduate students (11 males, mean age=23.2 years, 12 females, mean age=24.4 years) from the Psychology and Economics Department of the University of Adelaide acted as subjects in this experiment. Subjects were recruited via

flyers placed in contact pigeon-holes in both Departments. Using the criterion adopted in Chapter 8, all subjects were classified as non-regular or infrequent gamblers, having gambled at least once in the previous 12 months, but less frequently than once per week.

9.3.2 Apparatus

The poker machine was a mechanical 5-reel 'one-armed' bandit which had previously been used in a NSW gambling venue several years prior to the experiment. The machine was operated by placing a 20c coins into a slot and then pulling a handle to set the reels in motion. The maximum win on the machine was $500 and the smallest was 40c. All winnings were paid out instantly into a metal tray at the bottom. To record behavioural data, a small unobtrusive switch was attached to the underside of the handle. This was connected via a cable to a computer on the other side of the room. Whenever the handle was pulled, a behavioural response was recorded and stored on a data file. This data file contained a record of the number of pulls which had been made and the inter-response intervals (in seconds) recorded to the first decimal point.

9.3.3 Procedure

Subjects were asked to fill out a short questionnaire which asked them to provide details of how often they gambled on poker machines, how long they had played, and their age and gender. When the questionnaire was completed, the experiment began. Players were told that they would be given up to $15 in 20c pieces to play the machine and could keep any money which they won. Although giving gamblers money to play has been criticised by Anderson and Brown (1984), Dickerson (1989), and Dickerson et al., (1991, 1992) for reducing the realism of the study, Ladouceur et al. (1991) have found that allowing subjects to keep their winnings is sufficient to maintain the validity of gambling studies, especially when the study involves cognitive rather than arousal measures. In addition, players were told that the session would be divided into two sections. In the first set of 80 trials, subjects played continuously without interruptions from the experimenter. In the second part of the session, they were requested to speak aloud their expectancy of obtaining a 'good-sized win' during the next few trials. This expectancy was measured on a 7-point scale (1=not confident at all, 4=moderately confident, 7=extremely confident). Players were requested to provide a figure

approximately every 30 seconds, but more frequently if they felt that their expectancy had changed during this interval. A good-sized win was defined as one of approximately 20 coins or $4. whereas, 'a few trials' was defined as being between 1-10 trials. As in the first part of the session, players were requested to play for at least 80 trials. Players were told that they could stop after 80 trials if they so wished, but that they could continue to play beyond this point up to a maximum of 100 additional trials (i.e., a grand total of 80 + 80+ 100=260).

9.4 Results

9.4.1 Session Characteristics.

Details of the experimental sessions are presented in Table 9.1 for each of the 23 subjects and for the sample as a whole. As can be observed, all players except two

Table 9.1 Session characteristics for individual players and overall means (s.d.s)

	Total Plays (trials)	Total time (mins)	Number of wins (20c)	Amount Won (20c)	Play rate (/min)
1.	220	21.5	23	183 (83%)	10.2
2.	240	24.0	32	239(100%)	10.0
3.	160	17.0	14	86 (54%)	9.4
4.	160	19.2	19	122 (76%)	8.3
5.	200	22.9	27	171 (86%)	8.7
6.	160	17.4	25	185(115%)	9.2
7.	160	15.4	17	119 (74%)	10.4
8.	120	14.6	17	78 (65%)	8.2
9.	160	18.8	19	134 (84%)	8.5
10.	160	20.0	17	85 (53%)	8.0
11.	160	17.2	28	210(131%)	9.3
12.	150	16.6	15	144 (96%)	9.0
13.	170	18.3	26	192(113%)	9.3
14.	200	20.0	28	205(103%)	10.0
15.	180	15.4	21	127 (71%)	11.7
16.	200	25.3	24	124 (62%)	7.9
17.	200	20.4	24	178 (89%)	9.8
18.	200	18.4	26	144 (72%)	9.8
19.	220	22.8	29	159 (72%)	9.7
20.	180	21.5	21	192(107%)	8.4
21.	180	18.7	25	171 (95%)	9.6
22.	200	20.7	28	160 (80%)	9.6
23.	160	20.8	21	177(111%)	7.7
Overall Means	180.8	19.5	22.9	157 (87%)	9.3
S.D.	(27.5)	(2.8)	(4.8)	(41.7)	(1.0)

1. The percentages in column 5= total amt won/ total plays. Each win and each bet=20c.

(Subject 8 and 12) stayed on the machine for the required 160 trials. The two subjects chose to leave the experiment for the following reasons: Subject 8 because she did not wish to lose any more money, Subject 12 because he did not want to end the session a loser. [This action was in accordance with departmental ethics policy which specifies that subjects should be allowed to withdraw from experiments at any time, if they requested].

Overall, the results showed that players stayed on the machine for twenty minutes and made 180 plays at a rate of approximately nine per minute. This rate did not vary when subjects were asked to provide expectancy figures. A t-test for related samples showed the response-rates for two parts of the session were almost identical, $t(22) < 1$. Further inspection of Table 9.1 showed that players obtained wins approximately every 51 seconds (19.5 mins. x 60 divided by 22.9) or every 8 plays. The average percentage return to players was 156.8/180= 86.8%, indicating that players in the experiment lost 13% of the amount put into the machine.

9.4.2 Response Rate Differences

To test the hypothesis that response rates would vary according to the amount won, Dickerson et al.'s (1991, 1992) method was adopted. Each session was divided into 10-trial blocks (approximately 1 minute of play) and the mean inter-response interval and the total amount won was calculated for each block. Four types of block were distinguished: (1) No coins won, (2) 1-10 coins won, (3) 11-20 coins, (4) 21 or more coins. This classification differed from Dickerson et al.'s method because this machine did not pay out the same range on wins. For example, wins of 50 coins or more very rarely occurred on the machine used in the present study. The mean inter-response time was calculated for each type of block (1) to (4) for all 23 subjects. For example, if subject n had three blocks of 10 trials with win-totals of 21 coins or more, the mean inter-response time would equal mean IRT (block 1) + mean IRT (block 2) + mean IRT (block 3)/ 3. This method allowed the determination of a mean (s.d.) inter-response time for blocks containing total wins of 0, 1-10, 11-20 and 21+ coins.

These figures are presented in Table 9.2 and were compared using a one-way repeated-measures ANOVA. This revealed a significant main effect for the magnitude of reinforcement, $F(3,66)=12.85$, $p < .001$. Tukey post hoc comparisons using the

overall error term (MS residual=0.20, HSD=0.34) showed that inter-response intervals (IRTs) for blocks with total wins equal to 21+ coins were significantly greater than those observed for blocks with 0 or 1-10 coins ($p < .05$). The comparison between blocks with 21+ wins and 11-20 wins, and 11-20 wins and 0 wins, were both close to significance ($p < .06$). Therefore, although response rates were slower in blocks with larger wins/block (21+ coins), there was no difference between the rates observed for blocks with small wins as opposed to those with no wins.

Table 9.2 Mean (s.d.) Inter-response times in relation to variations in amount won (time in seconds)

	Amount won			
	0 Coins	1-10 Coins	11-20 Coins	21+ Coins
Mean	6.38	6.44	6.71	7.05
SD	(0.87)	(0.70)	(0.77)	(0.91)

9.4.3 Expectancy of Winning

Because expectancy figures were not obtained every trial, it was necessary to pool the responses. Those trials where no expectancy figure was spoken aloud (approximately 80% of trials) were assigned the last expectancy figure which had been verbalised (i.e., the 'current expectancy'). Thus, each block of 10 trials, received an overall expectancy score which could range from a minimum of 10 (i.e., expectancy of 1 out of 7 prevailing for all 10 trials) to a maximum of 70 (i.e., an expectancy of 7 out of 7 prevailing for all 10 trials). These figures were then divided by 10 to obtain the mean expectancy prevailing for each 10-trial block.

These means were analysed in the same way as the inter-response-intervals (IRIs) by obtaining each subject's mean expectancy for blocks with wins of 0 coins, 1-10 coins, 11-20 coins and 21+ coins. In this way, it was possible to examine variations in expectancies in relation to variations in reinforcement. The means and standard deviations for these measures are presented in Table 9.3, and were analysed using one-way repeated-measures analysis of variance. This revealed no significant differences, $F(3,66) < 1$, between each type of block, suggesting that players' expectation of winning did not vary according to the amount they were winning or losing.

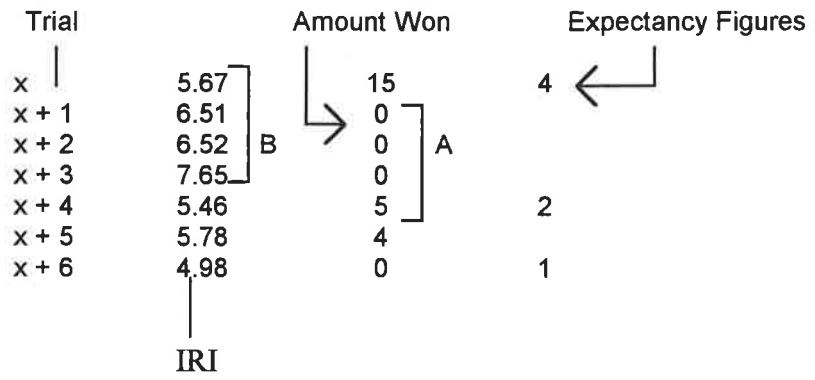
Table 9.3 Mean (s.d.) expectancy ratings in relation to variations in amount won (time in seconds)

	Mean Expectancy			
	0 Coins	1-10 Coins	11-20 Coins	21+ Coins
Mean	3.01	3.36	3.38	3.14
SD	(1.42)	(1.42)	(1.23)	(1.07)

A difficulty in using pooled data is that the expectancy measures associated with a particular block of trials may not be sufficiently sensitive. For example, a person might have obtained a large win at the end of a block of 10 trials and increased their expectancy from 1 to 7 (positive recency). However, because an expectancy figure of 1 prevailed for the previous 8-9 trials, the mean expectancy rating for the block as a whole would be low. Thus, the overall measure would not provide an accurate reflection of how the person's expectancies change in relation to outcomes. Accordingly, a more meaningful analysis might be to examine expectancy *changes* rather than overall expectancies.

In this analysis, a comparison was drawn between blocks of trials involving increases and decreases in expectancies (E). A schematic illustration of this analysis is provided in Figure 9.1, which provides sample data for seven trials (x to x + 6), including: the temporal interval between trials (IRI), amount won and the expectancy figures provided after three of the trials. As can be observed, the first expectancy change was a decrease of two units. This change occurred over 4 trials (x + 1 to x + 4) during which time the player won 5 coins (A). Therefore, the change was associated with a net gain of 5-4= + 1 coins. The time between the expectancy changes is taken from after the first expectancy figure (see note below table) and this comes to a total of (B)= 5.67 + 6.51 + 6.52 + 7.65 = 26.35 seconds between the changes, giving a mean response rate of 26.35/ 4 =6.59 seconds. By contrast, the second expectancy change of -1 units is associated with 2 trials giving a net loss of 1 unit.

Figure 9.1 Method of analysing expectancy changes: sample data



Note: IRIs represents the amount of time between one trial and the next. For example, 5.67 is the amount of time between trial x and x + 1 rather than x and x-1.

Using this technique it was possible to obtain the net win or loss and mean IRI associated with every positive and negative expectancy change for all players in the sample. These figures were then averaged to obtain the following data for each player:

(1). The mean net win (or loss) associated with expectancy increases.

(2). The mean net win (or loss) associated with expectancy decreases.

(3). The mean IRI associated with expectancy increases.

(4). The mean IRI associated with expectancy decreases.

A consistent negative recency effect would be suggested if players consistently increased their expectancies when losing rather than winning (i.e., net wins < net losses for expectancy increases), and decreased their expectancies when winning (i.e., net wins > net losses for expectancy decreases). By contrast, positive recency would be suggested if expectancy increases typically occurred in conjunction with winning sequences (i.e., net wins > net losses for expectancy increases), and expectancy-decreases were typically associated with losing sequences (i.e., net losses > net wins for expectancy decreases). The results of this analysis are presented in Table 9.4, which shows the percentage of positive and negative expectancy changes associated with positive outcomes (net wins between expectancy changes) and negative outcomes (net losses between expectancy changes). As can be observed, most of the intervals

analysed consisted of net losses (40+28=68%). Of the percentage of intervals containing net losses, 59% (40/68) involved expectancy increases and 41% (28/68) involved expectancy decreases. By contrast, of those intervals that involved net wins, 41% (13/32) involved expectancy increases and 59% (19/32) involved expectancy decreases.

These data were analysed using a 2 (Expectancy Change: increase, decrease) x 2(Outcome Valence, positive, negative) repeated measures ANOVA. This revealed a significant main effect for Outcome Valence, $F(1,16)=8.97$, $p < .001$, showing that most expectancy changes occurred in relation to net losses (M=68% vs. 32%), which is to be expected given that more losing than winning sequences were recorded. There was no significant main effect for Expectancy Change (M=52% vs. 48%), $F(1,16) < 1$, suggesting that players were just as likely to increase as they were to decrease their expectancies during the sessions. There was, however, a significant interaction between Expectancy Change and Outcome Valence, $F(1,16)=9.35$, $p < .001$. Analysis of simple main effects involving the comparison of means within each level of Outcome Valence showed that expectancy increases were more likely when players were losing, $F(1,16)=5.65$, $p < .05$, but that there was no significant difference between the percentage of expectancy increases of decreases associated with net losses, $F(1,16)=2.43$, $p > .05$.

These results suggest that expectancy changes were not consistently related to outcomes, and that certain biases were evident. Increases in expectancy were more likely to occur when players were losing (consistent with negative recency), although decreases in expectancy were not consistently associated with losing sequences (as would be predicted by negative recency).

A final analysis compared response rates in relation to positive and negative expectancy changes. Although it was predicted that response-rates might increase in relation to positive changes in expectancy, this was not confirmed, $t(17) < 1$. Instead, the results suggested that response-rates were generally unrelated to the direction of expectancy changes.

Table 9.4 Percentage of positive/negative expectancy changes in relation to net wins (outcome +ve) and net losses (outcome -ve) and mean (s.d.) inter-response intervals (response rates) for positive and negative changes.

	Expectancy Change					
	Increase			Decrease		
	Out (+ve)	Out (-ve)	R/Rate	Out (+ve)	Out(-ve)	R/Rate
	%	%	secs.	%	%	secs.
Subject						
1. (n=15)	13	38	6.19(1.27)	19	31	5.58(0.73)
2. (n=11)	27	19	6.07(0.35)	27	27	6.01(0.45)
3. (n= 4)	25	25	7.48(1.43)	25	25	7.66(0.99)
4. (n=10)	0	50	7.42(0.98)	10	40	7.67(0.18)
5. (n=14)	11	33	6.97(0.92)	11	44	6.79(0.88)
7. (n= 4)	0	50	5.75(0.25)	0	50	6.61(0.04)
10.(n=22)	15	55	7.53(1.86)	15	15	8.08(1.71)
11 (n= 4)	0	75	7.14(0.82)	0	25	7.08(0.00)
12.(n= 7)	0	43	6.39(0.36)	43	14	6.78(0.77)
13.(n= 7)	29	0	6.32(0.45)	14	57	7.62(0.58)
14.(n=12)	18	36	6.32(0.92)	27	18	6.06(0.83)
15.(n= 7)	14	42	5.91(0.67)	14	27	6.03(0.66)
17.(n=25)	13	38	7.55(0.43)	17	33	7.55(0.48)
19.(n=12)	40	10	7.02(0.99)	20	30	5.69(0.39)
20.(n=11)	0	60	6.29(0.15)	20	20	7.50(2.45)
21.(n=13)	15	38	6.85(1.15)	23	23	7.41(1.27)
22.(n= 7)	0	50	7.49(0.14)	50	0	7.35(0.23)
23.(n=10)	13	50	8.40(0.42)	13	25	7.54(0.64)
Mean(s.d.)	13(11)	40(17)	6.84(0.70)	19(12)	28(13)	6.94(0.76)

1. Data are not included for those subjects who never changed their expectancies, or changed them only once or twice.
2. The 'n's listed indicate the number of expectancy changes for each subject.

9.5 Discussion

The results of this study are generally consistent with Dickerson et al.'s (1991, 1992) findings that response rates are more sensitive to variations in gambling outcomes than cognitive measures. As shown in Table 9.2, larger wins were associated with a decrease in response rates while expectancy changes remained relatively unchanged (Table 9.2 and 9.4). Furthermore, this finding adds weight to Dickerson et al's assertion that poker machine gambling may be a schedule-based behaviour maintained by machine events. Although failing to replicate Dickerson et al.'s (1992) finding that small wins increase response rates, the results confirmed that larger wins appear to disrupt or decrease responses. In this study, it is not possible to attribute these response-rate changes to other factors such as experimenter interference

(Walker, 1992a) or variations in the time taken for the machine to pay out larger wins. Players were allowed to play freely with little interruption by the experimenter, and the payouts were activated by mechanical slides which returned coins to the tray at the same rate, irrespective of the number of coins. By contrast, observation of the players' behaviour suggested that pauses following the occurrence of larger wins appeared to be temporary rest periods for the players, with many stopping to count their winnings, study the pay-table, or stretch their arms or hands. This pattern appears inconsistent with the idea that poker machine gambling is based upon a variable-ratio schedule (Ferster & Skinner,1957), which involves a rapid and consistent rate of responding. Instead, the results seem more consistent with the pattern predicted by a fixed-ratio schedule, which involves both rapid response rates and inter-response pauses or 'rest periods' (a 'break and run' pattern). Players appear to build up their response rates to a certain asymptotic level, and then decrease this rate once the desired reinforcement or goal has been obtained.

The fact that this study found no significant response-rate increases in relation to intermediate levels of reinforcement would seem to reduce the strength of the operant explanation. However, there were several methodological reasons why response-rate increases might not have occurred. First, whereas Dickerson et al's studies were conducted in realistic setting with players gambling with their own money, this study used student gamblers in a laboratory setting. Consequently, players in the present study might have been less involved in the game, and so their interest did not increase when they obtained small wins. Second, whereas in Dickerson et al's (1991, 1992) study, 'small wins' were defined as those involving 1-50 credits (where each credit equalled 20c), in the present study this definition was restricted to wins of 20 credits or less[1]. Therefore, it is likely that many of Dickerson's 'smaller wins' involved 20 to 30 credits or more (i.e., wins of $5-6 per spin) which may have been considerably more reinforcing than the wins of 10-18 ($2.00 to $2.80) typically obtained in this present study. This is because of the different structural characteristics of the machines used in the studies. Whereas Dickerson's studies involved electronic poker machines which paid larger cash jackpots and gave players many medium-sized wins, the mechanical

[1] Note: This variation in definition was required in this study because of the relative infrequency of wins of 50 credits or greater.

model used in this study did not have these features. The maximum jackpot was only $500 (1/20th the maximum size available on electronic machines), and there were very few wins of more than $5. Thus, the level of reinforcement may have been insufficient to elevate response-rates above the baseline levels observed for zero reinforcement.

A second aim of this study was to examine whether players believed that they could predict when the machine was most likely to pay out a win. In investigating this notion, two possibilities were considered. The first, based upon the 'representativeness' heuristic or 'gamblers' fallacy' (Corney & Cummings, 1985; Kahneman & Tversky, 1972) was that winning would be viewed as a periodic phenomenon. Players would feel confident when they had not won for some time, but less confident after having obtained a good win. The second, based upon the 'availability' heuristic (Corney & Cummings, 1985) and Walker's (1988) observations, was that players would believe that winning and losing occurs in certain 'hot' or 'cold' periods, so that a win should increase the expectation of further wins, and vice versa.

As shown in Table 9.4, players clearly showed some biases or asymmetry in their expectancy changes. Players were very unlikely to increase their expectancy of winning when they won, but more frequently increased their expectancies when they lost. On the other hand, when players decreased their expectancies, this was just as likely to occur when they were winning or losing. Although these percentage changes are not entirely consistent with either cognitive bias, the pattern observed for the positive changes is generally consistent with the gambler's fallacy, which would lead players to expect wins to occur periodically rather than in runs or sequences. When players win, they believe that another win will not occur for some time. In this sense, the results are consistent with those of Cohen (1972) and Phares (1952), who suggested that 'negative-recency' was more likely to be observed in activities which players consider to be purely chance-determined.

However, a problem with this interpretation is that it is not clear whether the tendency to decrease expectancies following wins is the result of a belief in the gambler's fallacy, or the fact that players believed that wins are less probable than losses (Cohen, 1972; Winefield, 1962). That is, because wins are seen as rare and losses relatively common, it is logical to predict losses even when one is winning. In other words, the changes observed may be unrelated to a belief in the gambler's

fallacy. Observation of player behaviour confirmed that this may have been the case, with many players complaining that the machine 'never seemed to pay-out'. Yet, at the same time, many players also produced behaviour which was consistent with a belief in the gambler's fallacy. When some players won, they often appeared to lose interest in the game for a short period, with several making comments to the effect that they would 'have to wait some time for the next win'. Indeed, one player said that he wished the machine had an 'autoplay' feature so that he did not have to play out the ensuing trials. Unfortunately, it was often difficult, given the limitations of the methodology, to determine if, and when, players began to draw these conclusions (i.e., to decide that the machine was 'a loser'). This is because of the problem of determining how much information gamblers use when they make judgements about gambling outcomes. Although in the present study, it was assumed that the few trials preceding a given expectancy change are important, it is unclear whether this assumption is valid.

Instead, it is likely that gamblers' assessments of the game are influenced not only by the trials which immediately preceded this point, but by the previous outcomes of the game in general. The player who obtains a large win after losing on 50 or more trials, is unlikely to increase his expectancy of winning even though he has made a good profit during the previous two minutes of play. Indeed, it may be that for those who believe in the gambler's fallacy, the relationship between expectancies and winning is not linear. Winning leads to a decrease in expectancy, a moderate number of losses leads to an increase, whereas a very large sequence of losses leads to a decrease, with players no longer confident of winning at all. Therefore, the challenge for researchers is to develop a way in which to assess the relative importance of various events upon current expectations for winning.

Although Dickerson et al. (1992) have suggested that mathematical techniques such as Markov chain analysis can be used to examine the'carry-over' effects of previous events at t-1, t-2 and t-3, etc., it is not possible to develop a matrix which assesses the effect of a large number of previous events, e.g., the amount won in the previous 20 minutes. Furthermore, such models do not allow one to determine the relative importance of previous events; thus, it is likely that alternative methods and analyses are required. These methodological problems are further discussed in the following

chapters. In Chapter 10, the problem of ecological validity is addressed by replicating the present study in an ecologically-valid gambling venue using a direct-observation methodology, while Chapter 11 examines the use of heuristics and biases in the context of a study which required subjects to speak aloud their thoughts while gambling (Ladouceur et al., 1991).

Chapter 10

Study 6: Within-Session Characteristics of Poker Machine Gambling (a field study)

10.1 Introduction to Poker machine Study 3

Although reasonably realistic, Study 5 was subject to several limitations which restrict the extent to which the results can be generalised to other South Australian poker machine players. These limitations have been previously noted by Dickerson (1989, 1993), Ladouceur et al. (1991) and Walker (1988, 1992a) and concern the validity of studies conducted in contrived laboratory settings using student gamblers. Previous research by Gordon, Slade and Schmitt (1986) has suggested that student samples may not be representative of the general population[1]. Students tend to be from higher socio-economic backgrounds, have higher educational attainment, higher intelligence, greater welfare dependence, and different attitudes from other people in society. Accordingly, because these characteristics have often been linked to variations in gambling involvement (e.g., Dickerson et al., 1994, 1995, 1996; Kallick-Kaufmann, 1979; Kassinove, 1996; Volberg, 1997; Volberg & Steadman, 1992), it is likely that findings derived from student samples may systematically differ from results obtained using volunteer samples from the general community.

Earlier results in this research project add support to this assertion. In Chapter 5, for example, results showed that students were significantly less likely to gamble than others in the sample (58% vs. 79%), whereas in Study 2 (Chapter 9) not one regular (once per week) poker machine player was recruited in response to over 1000 invitational letters posted in two large university departments.

According to Dickerson (1989), such samples of occasional gamblers may be of limited value in gambling research. This is because gambling is a habitual behaviour. Irrational beliefs concerning the nature of gambling outcomes (see Griffiths, 1994; Walker, 1992b), stereotyped response patterns (Dickerson et al., 1991, 1992) are likely to be more strongly observed in people who gamble regularly, or who have well established gambling habits. Thus, it has been suggested that researchers are more

[1] Although research by Browne and Brown (1993a, b) and Metzger (1985) has shown that these differences may be smaller than initially suspected.

likely to advance current understanding of gambling behaviour by studying gamblers who gamble regularly, on one type of gambling, and on at least a weekly basis (Dickerson, 1995). In other words, it is possible that the lack of significant effects in Study 2, particularly in relation to expectancy changes, was partially related to the fact that the players were not experienced or committed gamblers.

A more serious problem, however, relates to the lack of ecological validity in the study (c.f. Baddeley, 1981; Chanpanis, 1967; Henchel, 1980). Although players were allowed to keep their winnings and played on a genuine poker machine with a valid percentage return (87%), the study was not conducted in a realistic gambling setting. Neither was the design of the machine consistent with those available in gambling venues in South Australia. Whereas the experimental machine was a mechical device operated by a single coin and a pull handle, the electronic machines available in South Australia are considerably more sophisticated. Electronic machines allow for multiple paylines, have music, sound-effects, larger jackpots and allow more varied bets. All players know that it is theoretically possible for them to obtain wins of several thousands of dollars on each spin. In addition, players in natural setting are exposed to a wider range of stimuli and can engage in a wider range of behaviours, such as interacting with their fellow players, drinking, smoking, and listening to the sounds of other machines. These environmental factors, and the more sophisticated design of the machines, are likely to increase the players' involvement and interest in the game. Thus, because of the absence of these factors in the laboratory study, many players may not have been sufficiently interested in the game, and this may have reduced the likelihood of them varying their expectancies or increasing their response rates at certain points in the game.

Therefore, a second experimental study was conducted involving a more realistic design. A sample of both regular and occasional poker machine players was observed playing in a formal gambling venue, with players allowed to play on the machine of their choice. Once again, based upon Dickerson's findings, it was predicted that response rates would be fastest in intervals containing only small wins (defined by Dickerson as wins of 1-50 credits), slower in intervals with no wins, but slowest of all in intervals containing large wins (defined as wins of more than 50 credits in Dickerson et al.'s studies). It was also predicted that these response rate variations would be

more strongly observed in regular players and that variations would persist into subsequent intervals. Here, previous research was extended by examining whether the response patterns could be replicated on more technologically advanced 5c machines, rather than on the older style 20c machines used in Dickerson et al.'s studies.

A second aim of this study was to examine whether players believed they could predict when the machine was going to pay out a good win. If response rate variations were merely the result of the a belief in 'representativeness' or the gambler's fallacy (Corney & Cummings, 1985; Kahneman & Tversky, 1972), one would expect expectancy decreases following winning sequences, and expectancy increases following losing sequences.

The third aim of this study was to examine the nature of 'stake' changes, in particular the way in which players varied the amount staked on each trial in response to winning and losing sequences. It is possible that this is another aspect of gambling behaviour which may be sensitive to variations in reinforcement.

10.2 Method

10.2.1 Subjects

This study involved 21 occasional gamblers (8 men, 13 women) and 18 regular gamblers (8 men, 10 women) recruited using an advertisement placed in a suburban newspaper (see Chapter 8). Regular gamblers were defined a those who gambled at least weekly on poker machines, whereas occasional (or non-regular players) were those who gambled less often. This classification was used to allow comparisons with previous studies of slot machine gambling (Dickerson et al., 1991, 1992; Griffiths, 1994, 1995a; Ladouceur et al., 1991).

The age of the two groups was compared by collapsing the 6 age categories described in Chapter 8. Within the occasional group 13 (62%) players were aged 18-35 years, 8 (38%) were aged 36 years or over; in the regular group 6 (33%) were aged 18-35 years and 67% were aged 36 years or over. This difference in percentages was not statistically significant, $\chi 2(1)=2.13$, $p > .05$. The groups did, however, differ in their level of gambling involvement. Regular gamblers spent significantly more money (in dollars) per session (M=32.5, s.d.=21.9) than occasional gamblers (M=20.0,

s.d.=14.0), t(37)=2.09, $p < .05$. The session duration (in minutes) of regular gamblers (M=123.9, s.d.=73.1) was also significantly longer than for the occasional players (M=66.0, s.d.=49.6), t(36)=4.22, $p < .01$ (note 1 missing data item). Therefore, these comparisons confirm the validity of dividing the sample on the basis of the frequency of participation. Once per week gamblers had a greater involvement in gambling than people who played less often.

10.2.2 Apparatus

Gambling behaviour, outcomes, and verbalisations were recorded using a miniature Sony video-recorder (approximately 20cm in length) with a powerful condenser microphone placed next to the machine during play. The recorder had a wide lens allowing the entire screen and gambling buttons to be filmed at a distance of 30cm. This allowed the recorder to be placed next to the players' arms, so that no part of the players' bodies (apart from their fingers) were in the picture. This recorder could be quickly moved from one machine to the next without disruptions to the recording process.

The poker machines used in the study did not differ from those in any other gambling venue in South Australia. All 16 were electronic and manufactured by Aristocrat Leisure Industries Pty. Ltd. or Olympic Amusements Pty. Ltd.. Each machine allowed a minimum bet of 5c per spin, allowed bets on 1-5 or 1-9 lines, a maximum bet of 90 credits or 10 credits for 9 lines ($4.50), and had a maximum jackpot of $10,000. The expected return from the machines ranged from 87% to 90%.

10.2.3 Procedure

The study was conducted in a central gambling venue in the city of Adelaide, South Australia. Players met the experimenter at a mutually convenient time inside the venue, were provided with an information sheet describing the details of the experiment, and were asked to fill out a short questionnaire describing their gambling habits. Players were told that they would receive $20 for participating in the experiment and were given the choice of: (a). Using this money in the experiment and receiving nothing afterwards if they lost it, (b). Using their own money during the experiment and receiving the $20 afterwards. Either way, players were told that they could keep any

money they obtained in the experiment. This method was generally consistent with that of Griffiths (1993b, 1994) and Ladouceur et al. (1991) who have found that allowing players to keep their winnings is sufficient to maintain the validity of gambling experiments.

Players were told to play as naturally as possible, and could choose any machine they liked and change machines whenever they wanted. The only restriction was that they were told to play for at least fifteen minutes so that a reasonable number of trials could be recorded. Once this 15 minutes had been completed, players were asked if they wished to continue. Those who said 'yes' continued with the experiment for as long as they wished (c.f. Griffiths, 1993b, 1994). Those who had not spent the entire $20 when they ceased playing were free to keep the remainder as a participation fee. Those who ran out of money before this time were free to play with their own money to continue the session.

Participants were told that the purpose of the task was to examine people's perceptions of poker machines and whether they could tell when the machine was more or less likely to pay out. A short rating scale (1-10) was placed just above the buttons and asked players to rate how confident they were that the machine would pay out a good-sized win (defined as 50 credits or more) during the next few trials (defined as the next 1-10 trials). Players were asked to speak aloud a number every 30 seconds, but could do so more frequently if they felt that their expectancy had changed during this interval. A rating of 1 meant that they were 'not confident at all', 5 indicated moderate confidence, whereas a rating of 10 indicated that they were extremely confident.

To reduce anxiety concerning the presence of a camera, players were invited to look through the viewing lens to confirm that only the screen was being filmed. Once each session was underway, the experimenter was able to leave the players alone with the camera, and this reduced the need for an observer scrutinising their actions from a nearby position. In this way, it was possible to recreate the conditions of a normal gambling session, relatively free from experimenter interference.

After the session was completed, there was a brief informal debriefing session in which the players were given the opportunity to talk about their experiences during the session, whether they believed there was any method to play poker machines, and

whether they felt their normal gambling behaviour had been affected by the experimental observations. In general, players said that their behaviour had not been affected by the experimental design, although 3 occasional players said they would have left the venue earlier had they been playing with their own money.

10.2.4 Post-Experimental Analysis

When sessions were completed, the recordings were transferred to VHS format and viewed by the experimenter. Scoring was undertaken using a small lap-top computer converted into an event-recorder. The amount bet on each trial, the amount won and the outcome of each spin were recorded by pressing keys on the keyboard, with inter-response intervals being the total time elapsed between the entry of successive bet amounts. This method allowed the determination of accurate inter-response intervals recorded to 1/10th of a second.

10.3 Results

10.3.1 Session Characteristics

Details of the session characteristics for the 39 players are provided in Table 10.1. This shows the total number of trials for each player, the total amount of time spent playing (excluding the time taken to change machines, complete bonus sequences and correct machine malfunctions), the total mount staked and won during the session, the percentage won or lost (total won/total staked), and the mean number of plays per minute (total trials/total time).

Table 10.1 shows that sessions typically lasted for 18 minutes with players making 225 responses at a mean rate of approximately 12-13 responses per minute. Of the 39 players in the sample, only four made a profit during the session. This is reflected in the mean payback rate of 81% which was slightly lower than the pre-programmed rate of 85-87% required by legislation in South Australia. Other analyses showed that players obtained a mean of 78 (s.d.=35.5) wins per session, suggesting that wins occurred approximately once every 3 trials (225 trials /78 wins) or every 14 seconds (18 mins./78). No significant group differences were observed for any of these session characteristics (all ts (37) < 1).

Table 10.1 Mean (s.d.) Session characteristics for occasional (n=21) and regular players (n=18)

	Total Plays (trials)	Total time (mins.)	Amount Staked (credits)	Amount Won (credits)	Win Rate (%)	Play rate (/min)
Occasional players						
Mean	218.2	17.3	1376.3	1140.6	83.1	12.3
S.D.	(108.5)	(7.2)	(620.1)	(653.3)	(22.3)	(1.8)
Regular Players						
Mean	235.9	18.7	1498.1	1189.5	78.3	12.7
S.D.	(104.4)	(7.2)	(688.3)	(747.7)	(23.7)	(2.6)
Overall Mean	226.4	17.9	1432.5	1163.2	80.9	12.5
SD	(106.6)	(7.2)	(651.6)	(696.9)	(22.9)	(2.2)

1. The percentages in column 5=total amount won/total amount bet. One credit= 5 cents.

10.3.2 Response rate variations

Response rate variations were analysed by dividing each session into blocks of 10 trials and calculating the mean inter-response interval and total amount won for each block. Blocks were classified into 4 categories according to the total amount won (0, 1-50, 51-100 and 100 or more credits). For each player it was possible to obtain a mean inter-response rate for blocks containing each of these four amounts.

This method was very similar to that employed by Dickerson et al. who examined response rates in one minutes blocks, which also typically contained 9-10 responses. (see Dickerson et al., 1991, 1992). The only difference was that the total number of credits won was considered rather than whether at least one win of a given size had, or had not occurred. Thus, whereas intervals containing three wins of 40 credits would be treated the same as intervals with one win of this size in Dickerson et al.'s studies, in the present study these intervals were distinguished. This seemed a more logical approach to adopt given that players are likely to regard, e.g., 4 wins of 20 credits as more reinforcing that 1 win of 15 credits. The analysis of intervals with larger amounts (over 100 credits) was not affected by this method of classification because 95% of these intervals contained single wins of over 100 credits, rather than separate smaller wins of less than 100 (e.g., 70 and 60 credits).

Mean inter-response rates for blocks of trials directly associated with each amount won (Current block) are displayed in Table 10.2, and were analysed using a 2 (Group) x 4 (Win Level) analysis of variance with repeated measures on the second factor. This revealed no significant main effect for Group, $F(1,13) < 1$, or Group x Win Level interaction, $F(3,39) < 1$, but a significant main effect for Win Level, $F(3, 39)=11.99$, $p < .001$. Tukey HSD comparisons applied to this result showed that inter-response intervals for intervals containing wins greater than 100 credits were significantly longer than the other 3 intervals ($p < .05$), but that there were no significant differences between intervals containing no wins or less than 100 credits.

In order to investigate Dickerson et al's (1992) suggestion that large wins influence response patterns in subsequent time periods, a second analysis was conducting using the mean response rates observed in blocks following those analysed above (Next block). The ANOVA, revealed no significant effects, with F-values for all main effects and interactions < 1, disconfirming the hypothesis that variations in response rates would be carried over into subsequent intervals or would be more strongly observed in regular players.

Table 10.2 Mean (s.d.) inter-response times (IRT) (in seconds) for current block and subsequent block, and expectancy levels for various levels of cash reinforcement

	Amount won in Block			
	0 Credits	1-50 Credits	51-100 Credits	101+ Credits
IRT(Current Block)				
Occasional	4.34 (1.2)	4.55 (0.9)	5.08 (1.0)	5.95 (1.0)
Regular	5.16 (1.5)	4.75 (0.3)	5.12 (0.4)	6.48 (1.4)
IRT (Next Block)†				
Occasional	4.68 (1.2)	4.73 (0.9)	4.70 (1.0)	4.63 (0.8)
Regular	5.24 (1.2)	5.04 (0.6)	4.94 (0.4)	4.46 (0.7)
Expectancy Level				
Occasional	3.98 (1.7)	4.74 (1.5)	5.45 (1.5)	5.87 (1.2)
Regular	4.32 (2.1)	3.74 (1.5)	4.14 (1.5)	4.71 (1.7)

1. † These figures represent the mean inter-response times for 10-trial blocks which occurred after 0, 1-50, 51-100 or 101 or more credits had been obtained in the previous block.
2. For all analyses (n=21) for occasional players, (n=18) for regular players. The only exception is for the comparison of expectancy figures associated with 0 wins, where (n=10 and 8 respectively).

10.3.3 Analysis of Expectancy Data

To determine whether expectancies of winning varied in relation to the level of cash reinforcement, each block of 10 trials was assigned a mean expectancy level by pooling the data for each 10-trial block to obtain the mean expectancy prevailing for the duration of these trials. Means and standard deviations for this analysis are shown in Table 10.2.

These data were examined using a 2 (Group) x 4 (Win Level) analysis of variance, and this showed no significant main effect for Group, $F(1,12) < 1$, Win Level, $F(3,36)=2.25$, $p > .05$, or Group and Win Level interaction, $F(3,36) < 1$, suggesting that players were no more confident of winning after having obtained larger wins than they were after having obtained small wins or no wins.

A second analysis examined the nature of expectancy changes made during the sessions. Based upon the ratio of total expectancy changes to the total number of plays, it was found that occasional players (Median=0.12, n=21) were significantly more likely to change their expectancies than regular players (Median=0.05, n=18), $U=53$, $p < .05$[2]. Further analyses examined expectancy changes in relation to winning and losing sequences. Using data only from those 36 subjects whose expectancies changed during the session, it was possible to determine the percentage of expectancy (Exp) changes falling into each of the following 4 categories: (i) net win, exp increase, (ii) net win, exp decrease, (iii) net loss, exp increase, (iv) net loss, exp increase. The percentages for each players were averaged to produce the means presented in Table 10.3(a).

Table 10.3 (a) Mean (s.d.) percentage of expectancy (exp) increases or decreases associated with winning and losing sequences.

	Net Wins		Net Losses	
	Exp Inc	Exp Dec	Exp Inc	Exp Dec
Occasional (n=20)	17.7(8.6)	6.4 (5.5)	28.8 (12.0)	46.1 (17.4)
Regular (n=16)	9.6 (9.2)	10.5 (10.0)	33.7 (11.8)	46.3 (10.0)

[2] Expectancy and stake changes were analysed using Mann-Whitney tests rather than t-tests because of the presence of several outliers (> 3 s.d. from mean). Research by Zimmerman and Zumbo (1990) has shown that the Mann-Whitney test is more powerful than t in such situations.

These data were analysed using a 2(Group) x 2(Outcome Valence: net win, net loss) x 2(Expectancy Change: positive, negative) analysis of variance, with repeated measures on the second and third factors. This analysis showed no significant main effect for group, $F(1,34) < 1$ (which is to be expected given that both rows should sum to approximately 100%), but a significant main effect for Expectancy Change, $F(1,34)=10.80$, $p < .01$, and Outcome Valence, $F(1,34)=221.3$, $p < .001$.

Inspection of Tables 10.3(a) shows that these effects were the result of a greater proportion of negative rather than positive expectancy changes, and also a greater proportion of expectancy changes having occurred after losing rather than winning sequences. This second effect was to be expected given that most players in the experiment lost money and would have experienced more losing than winning sequences (see Table 10.1).

Although no significant interaction was obtained between Outcome Valence and Group, $F(1,34)=1.16$, $p > .05$, there was a significant interaction between Expectancy Change and Outcome Valence, $F(1,34)=18.05$, $p < .001$. Analysis of simple main effects comparing the percentage of expectancy decreases in relation to winning and losing sequences showed that this interaction was the result of relatively more expectancy decreases having been made in relation to losing sequences, $F(1,34)=25.45$, $p < .001$. Again, this was the result of more losing sequences than winning sequences having been experienced by both groups.

No significant 3-way interaction was obtained between Group, Outcome Valence and Expectancy Change, $F(1,34)=3.43$, $p > .05$. However, as can be observed from Table 10.3(a), occasional players showed a tendency to increase, rather than decrease, their expectancies following winning sequences, whereas regular gamblers seemed less likely to believe that further wins would follow winning sequences.

10.3.4 Variations in the amount staked per spin

There was no significant difference between the mean amount staked by regular and occasional gamblers, ($M=6.69$, $s.d.=0.38$ vs. $M=6.79$, $s.d.=0.63$), $t(37) < 1$. However, further analyses of the pattern of stake variations revealed several results of interest. For example, comparison of the relative frequency of stake variations within each group (total number of bet changes/ total number of plays) showed that significantly

more stake changes were made by occasional players (Median=0.08, n=21) than regular players (Median=0.02, n=21), U=118, $p < .05$.

Variations in stake size were also examined in relation to the amount won or lost during each change. Using data from those players who changed their sakes during the session, the relative percentage of increases or decreases associated with winning or losing sequences were classified using the method described above. The mean percentages for this analysis are presented in Table 10.3(b).

A 2(Group) x 2(Outcome: net win, net loss) x 2 (Stake change, increase, decrease) analysis of variance applied to these results revealed no significant main effect for Group (both sum to 100%) or Group x Outcome interaction (both Fs < 1), or Stake Change main effect, $F(1, 23)=2.73$, $p > .05$, but a significant main effect for Outcome, $F(1,23)=369.60$, $p < .001$, showing that players were significantly more likely to change their stakes when they were losing. Although this was to be expected, given that most players generally lost money when they played, it was of interest to note that both groups were just as likely to increase their stakes when they were losing as they were to decrease them.

Table 10.3 (b) Mean (s.d.) percentage of stake increases or decreases associated with winning and losing sequences.

	Net Wins		Net Losses	
	Stake Inc	Stake Dec	Stake Inc	Stake Dec
Occasional (n=16)	7.4 (8.1)	6.5 (5.3)	40.7 (10.4)	43.0 (11.4)
Regular (n=9)	8.9 (3.8)	3.6 (4.1)	35.7 (6.6)	49.1 (5.2)

Finally, exploratory analyses conducted using Tukey post-hoc tests showed that, although both groups obtained similar proportions of winning and losing intervals (84% losing, 13% losing, 3% break even), regular players showed greater asymmetry in their bet changes. Regular players were significantly more likely to increase rather than decrease their stakes when winning (M=8.9% vs. 3.6%), and to decrease, rather than increase their stakes when losing (M=49.1% vs. 35.1%).

10.4 Discussion

The results of this study confirm that response rates appear to be influenced by variations in reinforcement. Consistent with the findings of Dickerson et al. (1991, 1992) and those in Chapter 9, it was found that the response rates of both regular and occasional gamblers were significantly slower during intervals containing larger wins (100 credits or more) than those containing total wins of less than this amount. While it is true that this response decrement is partially attributable to the greater payout time associated with larger wins (e.g., the time taken for music and sound-effects), a careful study of the video-tapes showed that many players paused even after the payout sequences had ended. During these pauses, players engaged in a variety of miscellaneous behaviours. These included: studying the screen to ascertain the combination of symbols responsible for the win, admiring their new credit balance, or pressing the 'collect button' to count the number of coins which had been won. Therefore, it can be concluded that the occurrence of larger wins often causes a genuine disruption in response patterns.

It was also hypothesised that response rates during intervals of zero reinforcement would be slower during intervals containing small to moderate-sized wins, but, as can be observed from Table 10.2, this prediction was not confirmed. Response rates for intervals containing no wins were no slower than those in intervals with wins of 1-50 or 51-100 credits. This is likely to be the result of the diferent structural characteristics of the machines used in the present study. In Dickerson et al.'s (1991, 1992) studies, 20c machines were used, whereas in the present study, players gambled on 5c machines. Five cent machines appear to differ from 20 machines in that they provide players with more frequent reinforcements. This is evidenced by the fact that in Dickerson et al.'s (1992) study, appoximately 21% of the total number of minutes observed contained zero reinforcement, compared with less than 0.5% in the present study. Therefore, it was not surprising to discover that these intervals had little effect upon the response-rates. Previous experience with playing poker machines is likely to have taught gamblers that such intervals are unlikely to last very long, and that reinforcements will soon be forthcoming.

A further prediction investigated in this study was that variations in response rate would be maintained for more than one block of trials (Dickerson et al., 1991, 1992),

and that this trend would be more strongly observed in regular players. For example, it was expected that, if large wins disrupted play-rates within a given block of trials, slower rates would also be observed in the subsequent interval. As the results in Table 10.2 show, however, neither of these predictions were confirmed in the present study. Response rates remained relatively stable from one block to the next, and this trend was observed in both regular and occasional players. Once again, it is possible that this discrepancy is linked to differences in machine characteristics. However, in this case, a more likely explanation is that it is linked to differences in experimental procedure. Whereas Dickerson et al.'s studies typically involved sessions of 40 minutes to an hour, this study had sessions of less than 20 minutes, and this might not have allowed players sufficient time to develop consistent, or 'stereotyped' response patterns.

This possibility is partially confirmed by the findings of Dickerson himself, who in a comparison of the response-rates of low, medium and high frequency players, found little evidence of 'carry-over' effects in low frequency players who also usually only played for less than 20 minutes (Dickerson et al., 1991). Thus, the findings in this study raise the possibility that the lack of strong 'carry-over' effects in Dickerson et al.'s (1991) low-frequency players may be attributable to the reduced session length rather than differences in the players themselves. Further research is clearly needed to determine whether greater similarity in response patterns will emerge when players of varying gambling experience are observed playing in sessions of a similar duration.

A further possibility is that this lack of variation was linked to demand characteristics. That is, it could be argued that, because players in the present study were told to play for at least 15 minutes, they might have been overly conscious of trying to maintain a consistent response rate because this is what they felt was required in the experiment. As a result, responding might have been less spontaneous and varied than that produced during a normal session. To address this possibility, the experimenter took the opportunity to observe the behaviour of players outside the confines of the experiment. These observation sessions suggested that, even when players were playing with their own money on different machines, their style of play did not appear to differ from that which had been produced during the experiment, in terms of their responses to small, large or no wins. This suggested that the

experimental design, including the presence of the small camera, did not seriously compromise the validity of the results.

However, the fact that variations in machine characteristics appear to influence response patterns makes it difficult to compare the results obtained by different researchers in different locations. For example, a comparison the present results with those obtained by Griffiths (1993b, 1994) in the United Kingdom, also reveals a number of important differences. Firstly, an examination of Griffiths' results, shows that Australian machines are generally played more quickly (approximately 11-12 plays per minute vs. 7-8 in the UK), and appear to contain fewer playing options, such as, for example, gamble buttons, light oscillations and other pseudo-skill features (Griffiths, 1995a). It is possible, therefore, that operant analyses of the nature conducted by Dickerson et al. (1991, 1992) and in this study, may be more relevant for Australian style machines than those in the UK. This is based upon the assumption that the potential for impaired control appears to be directly proportional to the rate at which gamblers can make repeated gambles (Dickerson, 1989, 1993).

This problem also arises when attempting to draw comparisons between the present results and those obtained in the laboratory study in Chapter 9 using an old-style, or mechanical poker machine. Response-rates were considerably faster in the present study (12 vs. 9 plays per minute) and considerably larger amounts were spent per turn. In the laboratory study, for example, players spent 20c per spin, whereas 34 cents (6.74 credits x 5c) was spent in the present study. When multiplied by the response rate figures described above, this suggested that players in the present study spent approximately $4.50 per minute compared with only $1.80 for those players in the laboratory study (a ratio of 2.25 to 1).

It is this capacity for increased monetary turnover which has undoubtedly enhanced the popularity of electronic machines in Australian gambling venues, and why people frequently find it difficult to control their expenditures. In allowing players the possibility of changing their bets from one spin to the next, modern machines increase the players' temptation to chase their losses, in particular by encouraging them to bet very large amounts in single spins. Indeed, this trend emerged strongly in the community gambling survey in Chapter 6, in which it was observed that approximately 37% of the regular poker machine players reported having spent more than they had

planned, and 33% having chased their losses on at least one occasion during the previous 6 months.

Based upon these findings, it was hypothesised that regular players would bet more per spin than occasional players. However, as the results showed, this prediction was not confirmed. Where the two groups did differ was in relation to the frequency and nature of stake changes. Regular gamblers were significantly less likely to change their stakes during the sessions and were more likely to change their stakes in the same direction as previous outcomes. Winning sequences tended to be followed by stake increases rather than stake decreases, whereas losing sequences tended to be followed by stake decreases, rather than stake increases.

Although such variations were not specifically examined in studies by Dickerson et al. (1991, 1992), these findings are consistent with the view that regular players tend to have a more 'stereotyped' style of play than occasional gamblers. It appears that this consistency extends not only to response rates (e.g., Dickerson et al., 1992), but to other aspects of the gambling process as well. Consistent with the principles of operant conditioning, it appears that those who have well established gambling habits become conditioned by certain machine events. Positive reinforcement, in the form of winning, leads to an increase in response strength (increased stake size), whereas the absence of reinforcement leads to a decrease in the amount (decreased stake size). In other words, as Dickerson (1979) has previously speculated in his studies of off-course betting agencies, it is possible that more than one schedule of reinforcement may apply in poker machine gambling. Although a paradigmatic illustration of a variable-ratio schedule, players appear to respond to poker machines as if they were based upon a fixed-ratio schdule, in which small wins maintain a fast consistent rate of responding, but where the occurrence of large wins gives rise to a temporary pause in responding (a 'break and run' pattern, see Davey, 1980). On the other hand, changes in stake-size may be maintained by a simple or continuous schedule of reinforcement, in which a reward (a win) increases the strength of responses, whereas the absence of reward (a loss) gives rise to a decrease in response strength. Clearly, further research is required to ascertain the reliability of these findings in sessions of a longer duration.

A final issue investigated in this study was whether (a). There would be any consistent relationships between reinforcement and players' expectancies that the

machine would soon pay out a good sized win, and (b) Whether regular and occasional player would differ in how their expectancies changed in relation to winning or losing. The results in Tables 10.3a showed that players were most likely to decrease their expectancies when losing, but were equally likely to increase or decrease their expectancies when winning. However, it is unclear from these figures whether players consistently applied cognitive biases such as the gambler's fallacy or the availability heuristic. If gambler's fallacy thinking had been consistently applied, relatively more expectancy increases should have occurred in relation to losing sequences, and relatively more decreases should have associated with losing sequences. On the other hand, use of the availability heuristic would have led to positive expectancy changes being typically associated with positive outcomes, negative changes with negative outcomes. As can be observed, the data appear to be most consistent with this latter view (positive recency), with the majority of expectancy decreases having occurred in conjunction with losing sequences and expectancy increases in relation to positive sequences.

However, while these data appears consistent with an 'availability bias', a detailed analysis of video-tape footage and post-experimental discussions, revealed that this interpretation might be misleading. Instead, despite the positive relationship between gambling outcomes and expectancy changes, it was clear that most players believed strongly in the gambler's fallacy. Rather than seeing events as independent, players believed that poker machines were deliberately programmed to run in cyles. To maintain the required percentage return of 87%, it was believed that long losing streaks had to be offset by short periods containing frequent large wins (termed 'hot periods'). Thus, the skill was to determine the point in the cycle which a machine had reached. Machines which had recently passed through 'hot periods' were to be avoided because they would not pay again for some time, whereas those which had not paid for a long time were to be chosen. In other words, both heuristics appeared to play a role in the maintenance of gambling. Long-term expectations were based upon the gambler's fallacy, but availability biases were used in the short-term to ascertain the point in the cycle which had been reached, i.e., whether a losing sequence was about to improve, or a winning sequence was about to end.

Indeed, in attempting to determine which machine was the best one to play, players were observed, or reported, using a number of unusual rituals and strategies. Summarised below in Table 10.4, these strategies or factors are those which players believed increased the chance of winning (that is, when the cycle of outcomes was about to change from negative to positive), and which suggested that the machine was to be avoided (when outcomes were likely to change from positive to negative).

Table 10.4 Strategies used to determine whether a machine was more or less likely to pay out

---

Positive Signs
1. Observation that a previous player had not won for some time.
2. Coffer sounds full when coins inserted into slot.
3. Large number of higher paying symbols appearing in the first few spins.
4. Wins obtained soon after the player begins gambling.
5. 'Combination' wins rather than 'scatter wins' occurring early in the session (see Chapter 4).
6. Last amount collected relatively small (this is still on the screen when a new player begins playing.

Negative Signs
1. Observation that a previous player had just obtained a large win.
2. Coffer sounds empty when coins are inserted into slot.
3. Few high paying symbols appear on the first few spins.
4. No wins obtained in the first few trials.
5. Symbols appear to be lining up, or a large number of 'near-misses' are occurring.
6. Last amount collected is quite large (e.g., several hundred credits).

As can be observed, these strategies are generally consistent with the use of both representativeness biases and the availability bias. 'Strategies' 3, 4 and 5 suggest that poker machine players base their expectations of future success upon the 'availability' events which suggest that the machine is 'warming up', whereas 'strategies' 1, 2 and 6, are consistent with the belief that losing sequences are eventually offset by losses, and vice versa. Therefore, these observations appear to offer some support for the suggestions of Corney and Cummings (1985), who speculated that availability and representativeness biases may play an important role in gambling.

At the same time, however, such behaviours could also be interpreted as offering further support for behavioural theories of gambling. Learning how to identify 'hot' as opposed to 'cold' machines could be interpreted as a form of discrimination learning, in which players try to recognise the conditions in which reinforcement is more or less likely. Through a process of classical conditioning (see Chaper 4) certain behaviours or

machine events come to be associated with winning, so that players believe that they can predict the outcomes. However, as noted in Chapter 4, the fact that many players in this study appeared to have quite complex theories concerning the way in which the machines were programmed, suggested that these beliefs or behaviours were unlikely to be merely the result of classical conditioning or coincidental associations. Instead, it may be that cognitive beliefs, such as the gambler's fallacy, give rise to an expectation that discrimination is possible or should be attempted, whereas behavioural processes 'teach' players ways in which these beliefs can be successfully applied in practice.

Conclusions

The results of this study provide further support for Dickerson et al.'s suggestion that the behaviour of regular poker machine players is more consistent or stereotyped than that of less frequent players. This consistency is not only observed in response rates (Dickerson et al., 1991, 1992), as this study shows, but also in variations in betting behaviour and the players' expectancies of winning. Nevertheless, it still remains difficult from a theoretical viewpoint to classify poker machine gambling as operant behaviour. Although Dickerson's studies and these two studies provide some evidence of schedule-based responding, with the selection of 'good' as opposed to 'bad' machines loosely equivalent to a form of discrimination learning, the role of cognitive factors cannot be entirely discounted. Post-experimental discussions suggested that players had quite complex theories concerning how the machines operated. It is possible that the lack of support for cognitive explanations in these studies is merely an artefact of the measures used. Expectanacy ratings of the nature used in this study appear to be an inadequate way of detecting the presence of underlying biases or irrational beliefs. Thus, it is is suggested that cognitive factors need to be researched using more effective techniques.

This possibility is explored in the following study, which provides details of a similar study conducted using the speaking-aloud method previously employed by Ladouceur et al. (1988), Walker (1992b) and Griffiths (1994). This method, as Walker (1992b) and Griffiths (1994,1995) have noted, allows researchers to obtain considerably more detailed information concerning the role of cognitions without unduly affecting the natural flow of gambling sessions. It is hoped that the combination of this technique

with the video-camera methodology used in the present study will allow greater insights into the context in which certain irrational beliefs or biases are employed.

Chapter 11

Study 7: Irrational Thinking and Cognitive Biases in Regular Poker-machine Gambling

11.1 Introduction to Poker Machine Study 4

The 'speaking-aloud' method was developed by Gaboury and Ladouceur (1988) and Ladouceur and Gaboury (1988) to study the cognitions of gamblers without the need for retrospective self-report or questionnaires. In this technique, players are requested to verbalise their thoughts while gambling. Statements which imply beliefs in the ability to influence outcomes are classified as irrational, whereas statements supporting the opposite belief are considered rational. In laboratory studies of roulette and slot machines, Gaboury and Ladouceur (1988), Ladouceur and Gaboury (1988), Ladouceur et al. (1988), have shown that over 70% to 80% of verbalisations recorded using this method are irrational. This irrationality has been found to take many forms. For example, players believe they can predict when the next payout will occur (e.g., I know I must win soon) as based on the gambler's fallacy, or that some skill or strategy can be applied (e.g., I think I've worked this game out). Alternatively, players may personalise gaming machines ascribing to them human characteristics such as moods (e.g., This machine is hungry, angry, or teasing me), or intentions (e.g., This machine does not want me to win). Walker (1992a, 1992b) and Ladouceur et al. have argued that such irrational beliefs 'may play a central role in maintaining gambling in games of chance' (Walker, 1992a, p.74).

However, as discussed in Chapter 4, a limitation of Ladouceur's early studies is that most, if not all, involved student players gambling in simulated gambling environments. As a result, it was uncertain whether the results could be confidently generalised to more experienced gamblers in real-life settings where people gamble for larger prizes, and risk their own money. To address this possibility, Ladouceur et al. (1991) conducted a further study which compared the percentage of irrational verbalisations produced by video-poker players in a laboratory setting with that obtained in a gaming venue. The results showed no significant difference in the percentage of verbalisations, thereby confirming the validity of previous laboratory studies. As long as players were

allowed to keep their winnings, laboratory and field studies appeared to be equally effective in identifying the cognitive processes underlying gambling behaviour.

Since then, further research by Griffiths (1994) and Walker (1992b) has examined the extent to which Ladouceur's Canadian findings could be generalised to slot machine players in other countries. Griffiths' work has examined adolescent fruit machine players in the UK, whereas Walker has studied electronic poker machines in NSW, Australia. Griffiths' study involved a comparison of 15 (once per week players) regular and 15 non-regular fruit machine players gambling on a machine in a club setting, whereas Walker studied high-frequency poker machine, video-poker and amusement machines players (these played three times per week or more often) in a NSW licensed club. Although generally supporting Ladouceur's conclusions regarding the role of cognitive processes, these studies were unable to replicate the high percentage of irrational verbalisations obtained by Ladouceur. For example, in Griffiths' study only 2.5% of the verbalisations produced by non-regular players, and 14% of those from regular players could be classified as irrational. Similarly, in Walker's (1992b) study only 35% of the total verbalisations produced by the 9 poker machine players were irrational.

Walker has advanced two explanations to account for this discrepancy. The first relates to differences in the nature of the machines used in each study, the second relates to differences in methods of calculation. As discussed in Chapter 8, fruit machines in the UK are not entirely equivalent to poker machines in Australia. Unlike Australian machines, UK slot machines often have 'skill-features' such as, for example, 'hold and nudge buttons' which allow players to exert some influence over the outcomes. Accordingly, many players believe that playing fruit machines is a skilful activity (see Chapter 8). Thus, Walker suggests that fruit machine players are less likely to rely upon, or develop, irrational beliefs. He suggests that UK fruit machines are more equivalent to Australian video-poker games which also use 'hold' functions. In support of this, he draws attention to the fact that the percentage of irrational thoughts produced in his studies of video poker players (e.g., Walker, 1992b) was very similar to that obtained by Griffiths (approximately 12% for regular players, 7% for non-regular players).

A second source of discrepancy was that Walker and Griffiths used different methods of calculating the percentage of irrational thoughts. Whereas Ladouceur et al. (1988, 1991) only examined verbalisations specifically relating to the play itself, Walker and Griffiths examined all verbalisations, whether they were game-related or not. In other words, the difference in percentages can be partly attributed to the use of a larger denominator in the latter studies. Indeed, when Walker (1992b) re-analysed his data and examined only 'strategic' verbalisations (i.e., those relating to decisions and judgements about the game) he found that 80% of these statements were irrational. This suggested that Ladouceur's findings could be generalised to slot machine players in other countries.

11.2 The Validity of Speaking Aloud Studies

The assumption underlying research using the speaking aloud technique is that cognitive beliefs play a central role in maintaining gambling behaviour. However, although these studies consistently showed that irrational thinking was a common feature of gambling, and that players showed considerable consistency in their cognitions, it is not clear whether such verbalised statements genuinely predict and maintain gambling behaviour (Griffiths, 1994, Walker, 1992a). For example, the level of irrationality has been found to be unrelated to reinforcement frequency (Ladcoueur, et al., 1988), or risk-taking (Ladouceur & Gaboury, 1988). Similarly, Griffiths (1994) found no difference between the behaviour of regular and infrequent fruit machine players, despite the fact that the former produced significantly more irrational verbalisations. Thus, as both Griffiths (1994) and Walker (1992a) have argued, the validity of speaking-aloud studies is subject to question. Unless verbalised statements can be shown to have predictive value, they cannot be seen as having a useful role in understanding behaviour. Such statements may instead be little more than ad hoc descriptions of behaviour that are produced merely to satisfy the requirements of the experiment; the cognitive processes may, in fact, play no part in the players' normal gambling sessions (Griffiths, 1994).

In addition, it is unclear to what extent these studies are influenced by demand characteristics. As Walker (1992b) has suggested, it is possible that the elaborate and colourful theories and beliefs expressed during experiments are only produced to

satisfy the requirements of the experiment. Subjects make these statements merely to maintain the 'flow of speech', but may not think this way at all outside of the experiment. This was partially confirmed by the observations of Griffiths (1994) who found that regular players were significantly more likely to 'go quiet' during the experiment and ceased producing any verbalisations, suggesting that they "...were on 'autopilot' in that they could gamble on fruit machines without attending to what they were thinking about..." (1995, p. 143). These results suggested that most gambling undertaken outside experimental settings is habitual and stereotyped (see Chapter 10), with gamblers not really being aware of the processes that underlie their behaviour (c.f. Nisbett & Wilson, 1977).

Walker (1992b) has partially countered this argument by drawing attention to the fact that his subjects were psychology students, who generally tend to be more intelligent and rational than the general population. He argues that, if demand characteristics play a role, these would have decreased the level of irrationality, because the socially-desirable response would have been to act rationally. Unfortunately, the validity of this assumption was not verified. Thus, it is unclear the extent Walker's results can be extended to other poker machine players in the Australian community. Whereas Walker's study would predict that non-student gamblers should be more irrational than students because of less education, the reverse may also hold. That is, because students are more creative and articulate than other members of the population, they may be: (a). better able to put their thoughts in words, and (b). more likely to develop theories and systems which they believe can influence the outcomes. Therefore, it is also possible that studies involving student gamblers may obtain higher percentages of irrational thinking than those involving less educated members of the general community.

Indeed, these issues were examined in the present study which utilised a direct observation methodology that allowed simultaneous recordings and comparisons of behaviour, outcomes and verbalised statements. In this study, the validity of Walker's (1992b) findings are examined using a larger, more diverse sample of non-tertiary educated gamblers recruited from the community. In addition, following Anderson and Brown (1984), who have suggested that stronger experimental effects are obtained in realistic settings, this study re-examined the relationship between irrational thinking

and measures of risk-taking (mean amount wagered) and gambling success (percentage won). It was hypothesised that greater irrationality would be associated with greater risk-taking, but unrelated to the amount won (Ladouceur et al., 1988). A second aim of this study was to examine the extent to which players employ the cognitive biases described in Chapter 4: e.g., availability, gambler's fallacy, simulation heuristics. In particular, it was of interest to determine whether these biases are used in any systematic way. Although previous research by Griffiths (1994) has suggested that these biases are of limited predictive value, a more accurate and reliable examination of this issue is likely to be obtained using a direct observation methodology (as in the present study). Finally, this study extended previous research by examining the nature of gender differences in irrational thinking. Although such comparisons were not undertaken in previous studies of slot machine gambling because of the predominance of male subjects, Hraba & Lee (1995) and Mark & Lesieur (1992) have suggested that gender-differences need to be examined if results are to be more confidently generalised to all gamblers in the community.

11.3 Method (similar to Study 6, but reproduced for convenience)

11.3.1 Subjects

Twenty regular poker machine players were recruited via an advertisement placed in a suburban newspaper. This sample consisted of 12 women and 8 men, all of whom played poker machines regularly, on at least a weekly basis. Of the 8 men, 1 (13%) was aged 18-35 years, 6 (76%) were aged between 36 and 55 years, and 1 (13%) was aged over 55 years of age. Of the 12 women, 3 (25%) were aged 18-35 years, 7 (58%) were aged 36-55 years, and 2 (17%) were aged over 55 years. Overall, players reported a mean expenditure per gambling session of $26.67 (s.d.=20.82) and a mean session length of 98.96 minutes (s.d.= 68.92).

11.3.2 Apparatus

Gambling behaviour, outcomes, and verbalisations were recorded using a miniature Sony video-recorder (approximately 20cm in length) with a powerful condenser microphone placed next to the machine during play. The recorder had a wide lens

allowing the entire screen and gambling buttons to be filmed at a distance of 30cm. This allowed the recorder to be placed next to the players' arm, so that no part of the players' bodies (apart from their fingers) were in the picture. This recorder could be quickly moved from one machine to the next without disruptions to the recording process.

The poker machines available in the venue did not differ from those in any other gambling venue in South Australia. All 16 were electronic and manufactured by Aristocrat Leisure Industries Pty. Ltd. or Olympic Amusements Pty. Ltd.. Each machine allowed a minimum bet of 5c per spin, allowed bets on 1-5 or 1-9 lines, a maximum bet of 90 credits or 10 credits for 9 lines ($4.50), and had a maximum jackpot of $10,000.

11.3.3 Procedure

The study was conducted in a central gambling venue in the city of Adelaide, South Australia. Players met the experimenter at a mutually convenient time inside the venue, were provided with an information sheet describing the details of the experiment, and were asked to fill out a short questionnaire describing their gambling habits. Players were told that they would receive $20 for participating in the experiment and were given the choice of: (a). Using this money in the experiment and receiving nothing afterwards if they lost it, (b). Using their own money during the experiment and receiving the $20 afterwards. Either way, players were told that they could keep any money they obtained in the experiment. This method was generally consistent with that of Griffiths (1994) and Ladouceur et al. (1991) who have found that allowing players to keep their winnings is sufficient to maintain the validity of gambling experiments.

Players were told to play as naturally as possible, and could choose any machine they liked and change machines whenever they wanted. The only restriction was that they were told to play for at least fifteen minutes so that reasonable number of trials could be recorded. Once this 15 minutes had been completed, players were asked if they wished to continue. Those who said 'yes' continued with the experiment for as long as they wished (c.f. Griffiths, 1994). Those who had not spent the entire $20 when they ceased playing were free to keep the remainder as a participation fee. Those

who ran out of money before this time were free to play with their own money to continue the session.

11.3.4 Instructions

These were similar to those used by Walker (1992b). Participants were told that the purpose of the task was to examine what people were thinking while they were playing poker machines. They were told to speak aloud whatever thoughts occurred to them without any censoring. Following Ladcouceur et al. (1988, 1991), and Griffiths (1994), they were told not to be concerned if what they said did not make sense, was in broken sentences or seemed irrelevant. When each player had decided upon a machine, he or she was given 2-3 minutes to practise speaking-aloud, and to grow accustomed to the presence of the recording device. During the session, the experimenter sat on a stool several metres from the subject and observed the subject's progress. If subjects discontinued talking for 30 seconds, they were prompted using statements, which included: 'Please say what you are thinking about the game', or 'Please keep on talking' (Walker, 1992b).

After the session was completed, there was a brief informal debriefing session in which the players were given the opportunity to talk about their experiences during the session, and whether they had experienced any difficulties verbalising their thoughts during the experiment or whether this task had affected their normal gambling behaviour.

11.3.5 Post-Experimental Analysis

When sessions were completed, the recordings were transferred to VHS format and viewed by the experimenter. Scoring was undertaken using the same method as in Chapter 10, with responses and outcomes recorded using an event-recorder. Verbalisations were transcribed in a second viewing session and indexed by trial number so it was possible to match up specific statements with specific events. Individual verbalisations were defined as those passages of speech on a single topic preceded and followed by a pause (Walker, 1992b).

11.4 Results

11.4.1 Session Characteristics

Details of the session characteristics for the 20 players is provided in Tables 11.1. This show the total number of trials for each player, the total amount of time spent playing, the total amount staked and won during the session, and the mean number of plays per minute (total trials/total time).

Table 11.1 Session characteristics for regular players (including overall means and s.ds).

	Total Plays (trials)	Total time (mins)	Amount Staked (credits)	Number of wins	Amount Won (credits)		Play rate (/min)
						%	
1.	229	31.5	1281	68	821	(64)	7.3
2.	166	14.0	730	29	528	(72)	11.8
3.	220	17.0	656	20	144	(22)	12.9
4.	269	19.0	1343	107	853	(64)	14.2
5.	261	19.3	1396	82	958	(69)	13.5
6.	141	11.0	702	48	441	(63)	12.8
7.	99	12.0	495	40	3007	(607)	8.3
8.	318	22.0	1642	99	1557	(95)	12.7
9.	165	15.4	901	60	1113	(124)	10.7
10.	221	19.0	1101	48	706	(64)	11.6
11.	166	15.0	989	49	898	(91)	11.1
12.	161	16.0	1449	49	768	(53)	10.1
13.	134	11.7	652	47	412	(63)	11.5
14.	153	12.9	749	45	372	(50)	11.8
15.	207	19.6	728	46	1015	(139)	10.6
16.	153	11.7	706	47	321	(45)	13.1
17.	234	23.0	1687	117	1518	(112)	10.2
18.	233	19.4	1081	57	980	(91)	12.0
19.	350	30.0	2010	48	1657	(82)	11.7
20.	190	15.2	1365	47	993	(73)	12.5
Mean	203.5	17.7	1083.2	57.2	953.1	(102.2)	11.5
S.D.	(61.7)	(5.5)	(409.9)	(24.6)	(619.8)	(118.9)	(1.6)

1. The percentages in column 6=total amount won/total amount bet. One credit= 5 cents.

Table 11.1 shows that most subjects were able to stay on the machine for the required 15 minutes, and that some persisted for over half an hour. Players produced a mean of 11-12 responses per minute and were reinforced approximately every 3 or 4 spins. Although the overall percentage suggests that players made a profit from playing, a closer inspection of Table 11.1 shows that this was almost entirely attributable to the success of Player 7. Overall, 80% of the players lost money when

they played. This was reflected in the median return of 72.5% for the sessions as a whole.

11.4.2 Classification of Verbalisations

The transcribed verbalisations were content analysed and classified into one of 3 categories: irrational, rational or other. Irrational statements were those which were incorrect or which suggested that players were attempting to influence the outcome of the game in inappropriate ways. Five types of irrational statement were identified, and these were classified using the categories developed by Walker (1992b), Griffiths (1994) and Ladouceur et al. (1988).

(i) *Superstitious Rituals, Hypotheses or Predictions*: These were statements which suggested the use of false strategies or techniques to influence the machine, e.g. "That jigged it up didn't it", "I'll put in a few more coins and that might adjust the machine", "After a good spit, it's good to go down for a few presses", "Maybe it's going to warm up".

(ii) *Incorrect Linking of Cause and Effect:* These statements suggested that players were making unfounded or illogical associations between events which had no rational connection, e.g. "The more credits you pay, the more likely the scatters are to come up", "I'll try to push another button...you almost feel that the machine can tell."

(iii) *Inappropriate Rationalisation of Near-Misses*: These statements referred to beliefs relating to the fairness of the machine. Any statement which suggested that the machine was cheating, or 'stopping' the player from winning by not providing all the winning symbols was classed as irrational, e.g., "I'll tell you what: that bottle drops a lot down the bottom there. Stops you heaps of times.", "That's why I reckon it's rigged-the bottle keeps dropping there all the time".

(iv) *Personification of the Machine*: Any statement which suggested that players were striking bargains with the machine, attributing human emotions to it, or insulting it, were classed as irrational. Some typical examples included: "This machine might be in a good mood", "All right I'm going to start insulting you",

"I'm going to swap machines on you-I will go to your partner next door", "I thought the machine wasn't very kind to me."

(v) *References to Personal Skill*: Any statement which referred to the players' individual abilities, or relative ability compared with other players, was classified as irrational. No statements of this nature emerged in this study.

(vi) Inappropriate *References to Luck*: Statements which referred to personal luck as a quality of the machine or the individual were classified as irrational. Some examples of these statements included: "I would have sworn this machine was lucky", "Come on. Lucky touch", "It's not my lucky day".

Verbalisations were classified as rational if they provided accurate assessments of strategies, odds, or players' ability to control the game. Also included were any statements relating to decisions or actions undertaken during the game, e.g., the amount of time which the person would continue, the amount that would be staked on each turn, and rational courses of action. Some examples included: "I don't know when it's going to do something. I really don't have a clue", "I'll up my bet to 10, if I don't win, I'll go down", "I'll take out 5 and put 5 back in", "I think I should go down to 5 lines", "I suppose you have to bet big to win big".

The Other category consisted of general descriptive statements relating to specific outcomes of the game ("Hey I won 100 on that one."), descriptions of how the session was going ("Going downhill at a rate of knots"), and other miscellaneous statements about the machine ("So he's the substitute", "I like the colours", "It pays from both sides"). Also included in the Other category were expressions of emotion, ("This is making me really angry", "This is so frustrating"), sarcasm ("Two! Big deal!"), and statements of motivation ("Just as long as I can get some entertainment out of this thing to make it last longer.").

To check the reliability of the coding, a random sample of 5 transcripts was given to a second judge familiar with poker machines. Ninety percent of classifications were similar (irrational, rational, other) to those of the author. This figure is consistent with the high reliability coefficients obtained by Ladouceur et al. (1988) and Walker (1992b) using one or more independent judges.

11.4.3 Level of Irrational Thinking

The percentage of irrational thinking was assessed in terms of two indices developed by Walker (1992b). The first index was based upon the ratio of the total irrational statements (I) produced over the total number of verbalisations recorded (T), where T= Σ (Number of irrational statements (I) + Number of rational statements (R) + Number of Other statements (O)). The second index assessed the irrationality of strategic statements, i.e., statements which related specifically to how the game was being played. This index was the ratio of the total irrational statements (I) over the sum of the number of irrational statements + the number of rational statements, Σ(I + R). These indices were calculated for each player and then averaged to obtain overall percentages of irrational statements for the sample. These individual ratios and the overall percentages are presented in Table 11.2.

Table 11.2 The percentage of irrational statements in individual players and in the overall sample

	Total	Irrational	Rational	Other	I/ total	I/ I + R
1.	60	22	17	21	.37	.56
2.	33	0	0	33	0	n.a.
3.	29	3	0	26	.10	1.00
4.	22	3	0	19	.14	1.00
5.	9	2	0	7	.22	1.00
6.	25	1	4	20	.04	.25
7.	14	1	0	13	.07	1.00
8.	21	2	0	19	.10	1.00
9.	30	2	1	27	.07	.67
10.	92	7	5	80	.08	.58
11.	67	16	0	51	.24	1.00
12.	63	15	0	48	.24	1.00
13.	31	3	0	28	.10	1.00
14.	23	2	0	21	.09	1.00
15.	56	13	10	33	.23	.57
16.	55	5	9	41	.09	.29
17.	47	5	18	24	.11	.22
18.	40	8	11	21	.20	.42
19.	43	4	1	39	.09	.80
20.	40	11	3	26	.28	.79
Mean	40.0	6.1	4.0	30.0	.14	.75
SD	20.1	6.0	5.7	15.8	.09	.28

The figures in Table 11.2 do not provide an entirely accurate reflection of the volume of speech recorded for each subject. Many verbalised statements were 50 words or more in length, others consisted of only one or two words. Nevertheless, there was considerable variation in the amount of speech recorded for each subject, with some speaking almost continuously throughout the session, others relatively infrequently. As can be observed, only 14% of the total statements produced were irrational. However, when analysis was confined to game-related or strategic verbalisations, this percentage increased to 75%, suggesting a high degree of irrationality in game-related cognitions.

11.4.4 Percentage of Wins and Irrationality

A third analysis examined these indices in relation to the percentage return received by each player. The sample was divided into two groups based upon the median percentage return of 72.5%. Group 1 (the High Win group, n=9) obtained a percentage return of 73% or greater, whereas Group 2 (the Low Win Group, n=11) obtained a return of 72% or less. A comparison of the percentage of total irrational verbalisations across these two groups revealed no significant difference (see Table 11.3).

Table 11.3: Mean (s.d.) percentage of overall irrational and irrational strategic statements in relation to gender, win percentage and level of risk-taking.

	Overall Measure	Strategic Statements	t-value
Gender			
Men (n=8)	0.19 (0.11)	0.61 (0.28)	2.00
Women (n=12)	0.11 (0.07)	0.84 (0.23)	1.78
Win Percentage			
High (n=9)	0.16 (0.09)	0.72 (0.26)	<1.00
Low (n=11)	0.13 (0.10)	0.77 (0.30)	<1.00
Risk Level			
High (n=9)	0.18 (0.11)	0.10 (0.06)	2.11*
Low (n=11)	0.77 (0.26)	0.71 (0.30)	< 1.00

* $p < .05$

11.4.5 Risk-taking and Irrationality

A fourth analysis examined the proportion of verbalisations in relation to the mean amount staked during the session. This mean was derived by dividing the mean total

amount staked during the sessions by the mean total number of trials. The median amount staked per turn was 5.0 credits, and this was used to divide the sample into two groups: Higher Risk Group (n=9) who staked more than 5 credits per turn, and the Low Risk Group (n=11) who staked less than 5 credits per turn. These two groups did not differ significantly in terms of the proportion of men and women or general gambling habits (see Table 11.3).

11.4.6 Types of Irrational Verbalisation

A further analysis examined the relative frequency of each type of irrational statement. Described above, these categories included: superstitious beliefs and predictions, false attributions of cause and effect, inappropriate rationalisation of near-misses and references to personal luck. Overall and gender comparisons of these percentages are presented in Table 11.4.

The results in Table 11.4 show that superstitious rituals and predictions were the most commonly observed type of irrational statement, followed by personalisation of the machine and inappropriate statements of cause and effect. Analysis of these results revealed that women were significantly more likely to personalise the machine than male players.

Table 11.4 Mean (s.d.) percentages of each type of irrational statement

	Overall (n=20)	Men (n=8)	Women (n=12)	t-value (df=18)
1. Superstitious rituals, beliefs	37.2 (37.7)	34.6 (31.5)	35.8 (42.2)	< 1.00
2. Inappropriate cause & effect	21.6 (25.5)	28.9 (25.8)	16.4 (25.3)	< 1.00
3. Rationalising near-misses	5.2 (22.3)	12.5 (33.1)	0.0 (0.0)	< 1.00
4. Personalising the machine	24.2 (22.6)	5.6 (10.6)	37.7 (31.4)	2.63*
5. Belief in personal luck	11.8 (22.6)	18.5 (33.4)	6.9 (14.8)	< 1.00
Mean number of statements	6.1 (6.0)	8.0 (6.7)	5.0 (5.0)	

1.These figures were determined by calculating percentages for each player and averaging these percentages across the sample.
2. * $p < .05$

11.4.7 Evidence of Cognitive Biases: Qualitative Examples

There was considerable evidence to suggest that some of the cognitive biases described in Chapter 4 are commonly used by Australian poker machine players. Comparison of the transcripts also showed that these biases tend to used in relation to

specific events. For example, counterfactual thinking or simulation heuristics were frequently used when players obtained near-misses (not all the desired symbols appeared, or a winning combination on another non-paying line) or failed to increase their bets just before the occurrence of large wins. Some representative examples included:

- "...typical for me lately has been to play the 3 lines...then again I don't want to miss out on the 5th line-just in case" (Subject 1)
- "...I should have upped the bet a bit more...I had a feeling something would come out" (Subject 1)
- "Why didn't I go with my instincts and up my bet just for that one shot" (Subject 1)
- "Where was the other one? I would have got the free spins if it had stayed there." (Subject 3)
- "If there had been another one, I would have got 200." (Subject 9)
- "If that had been down there, there would have been 3 of them." (Subject 4)
- "...if there had been another one up there...(Subject 10)
- "Look at that. It just had to be up there and I would have got 4 of them." (Subject 11)
- "There does not look like there's much coming up on them. But sometimes you miss and wish that you had bet on a few more lines." (Subject 15)

Many players also employed gambler's fallacy (representativeness bias) reasoning. This usually occurred when players were losing, but occasionally when players were winning. Some examples are provided below:

- "Come on, it's got to come out soon" (Subject 3)
- "You would have thought I'd have got another free spin by now" (Subject 3)
- "I think this is one of those where the next person will win" (Subject 5)
- "They give you one payment and then they go quiet for a while" (Subject 10)
- "I think you get one win and then it dies" (Subject 10)
- "This is going to win now because it's had a stop" (Subject 11)

- "Generally what happens is that when they've done that [paid out], they don't tend to come back for a while. So, I generally drop down a few lines..." (Subject 15)
- "That's better...I don't think it will pay again for a while." (Subject 15)
- "Usually when they pay out, you think they will not pay out any more." (Subject 18)

There was also some evidence to suggest the use of availability biases. Players often based their expectations of winning upon the occurrence of events, or 'signs' which indicated that the machine was about to enter a winning phase. In other words, the probability of winning in subsequent trials was based upon the frequency of reinforcements in the previous trials. Some examples of this type of thinking are listed below:

- "I'm still getting prizes, so there must be something..." (Subject 1)
- "I don't think it's going to pay...So far the only thing which has paid is the scatters" (Subject 2)
- "If is pays I stick with it, if it's not giving me anything like now, I don't play anymore. I play another one" (Subject 6)
- "Now I'm on a roll" (Subject 8)
- "I don't like to play when there's not much happening" (Subject 18)
- "You always feel more hopeful when you get a black rhino [highest paying symbol] to start with" (Subject 19)

11.5 Discussion

(a) A comparison of percentages

The results of the present study are generally consistent with previous studies (e.g., Gaboury & Ladouceur, 1988; Griffiths, 1994; Ladouceur et al., 1988; Ladouceur et al., 1991; Walker, 1992b) which have employed the 'speaking-aloud' method to examine gambling-related cognitions. Seventy percent of game-related cognitions were found to be irrational, which is similar to 86% obtained by Gaboury and Ladouceur's study of roulette, and 80% reported by both Ladouceur et al. (roulette-1988, video-

poker-1991) and Walker (poker machines-1992b). However, in contrast to Walker's (1992b) study, the ratio of irrational statements to total statements was found to be considerably lower (14% vs. 38%), which is more consistent with the percentage obtained by Griffiths (1994) using adolescent fruit machine players in the UK. Although this result would appear to cast doubt on the reliability of the 'speaking-aloud' method in Australian slot-machines studies, several explanations can be advanced to account for this discrepancy. First, whereas the present study provided players with money to gamble, Walker's players gambled with their own money, which may have reduced the realism of the study and players' motivation to influence the outcomes. Second, whereas Walker's study used gamblers who gambled at least three times per week, players in the present study had to gamble only once per week to qualify for inclusion. Thus, consistent with Griffiths (1994) who has argued that irrationality increases with gambling experience, Walker's players may have had more gambling experience and therefore a wider repertoire of irrational strategies. Third, because the gamblers in the present study were drawn from low socio-economic areas with low levels of tertiary education, they may have been less able to develop strategies to influence the outcomes, or verbalise their thoughts while they were gambling.

This first point has previously been addressed by Ladouceur et al. (1991) who found that players provided with money to gamble produce a similar percentage of irrational statements to those who gamble with their own money. Thus, given that players in the present study were allowed to keep their winnings, this factor is unlikely to have been important. Similarly, in relation to the second point, it is difficult to argue that gambling experience played a role because Ladouceur and his associates have obtained some of the highest percentages using gamblers with very little gambling experience. The third point is, however, more problematic. Although Ladouceur and Griffiths (e.g., Griffiths, 1994; Ladouceur et al., 1991) have obtained results using student subjects which would appear to contradict this argument, there are problems associated with generalising their results to Australian studies. The UK-style slot-machines used by Griffiths are not entirely equivalent to Australian machines (see Walker, 1992a) Furthermore, because Ladouceur's studies have generally only

considered strategic statements, it is not possible to determine the 'typical' overall percentage of irrational statements produced by student gamblers in other studies.

Walker's (1992b) solution to this problem has been to make the reasonable assumption that students, because they are better educated, are less likely to be irrational than non-students. However, one could argue that the reverse might be true. That is, because students are trained to develop problem-solving skills and to form logical connections between ideas and events, they may be more susceptible to developing erroneous beliefs when they gamble. Furthermore, because students have superior verbal abilities compared with other members of the community, they may also be better able to justify or describe their behaviour. In other words, the tendency to make irrational statements may be as much a reflection of the players' ability to satisfy the requirements of the experiment as it is of aberrant thought processes.

Clearly, to investigate this hypothesis thoroughly, it would be desirable to conduct a second study which compares the verbalised statements of student and non-student gamblers matched for gambling experience and also on some measure of verbal fluency. However, some anecdotal evidence in support of this hypothesis was obtained in the present study by analysing the statements made by players during and after the sessions. These statements showed that several players found the task of verbalising their thoughts extremely difficult. For example, players reported that it was very difficult to speak and gamble at the same time, or to think of things to say because complex thought processes were not a usual feature of their gambling (e.g., " I'm looking at what's happening on the screen, and I can't think of anything else to say"). Some also reported that their gambling was maintained by internal states (e.g., "[I can't]...say very much [because] ...I am very mesmerised by the game."), whereas others, even with extensive prompting, were unable to produce anything more than one or two word responses (e.g., 'Come on!', 'No', 'Damn'). Such difficulties were apparently not experienced to the same degree by Walker (1992b) in his study of student gamblers.

(b) Representativeness and Availability Biases

Despite these problems, the results of the present study also suggested that cognitive factors may still be important in slot machine gambling. Not only did the majority of players in the present study make numerous irrational statements, but also the types of

irrational verbalisation were consistent with those observed in previous studies, irrespective of the different sample characteristics (e.g., Griffiths, 1994, Ladouceur et al., 1988, 1991; Walker, 1992b).

For example, as illustrated by the statements listed above, there was considerable evidence to suggest the use of gambler's fallacy logic (Corney & Cummings, 1985; Kahneman & Tversky, 1972). When players were losing, they made comments to the effect that large wins 'were due soon', or 'were long overdue', that the machine 'would soon warm or fill itself up'. On the other hand, when they were winning, players would say that the 'machine was dead' or had 'had done its dash' and would move to another machine. This type of behaviour was most strongly observed in Player 18, who changed machines 16 times in 20 minutes, and also indirectly by the actions of Players 3, 4 and 20, who argued that one could determine the profitability of the machine by dropping a few coins into the slot. If the coins hit the bottom of the coffer, they would not play the machine because they believed that the machine was 'empty' and had already paid out a large win to some other player.

Such behaviour is consistent with the observations of Walker (1988) and the findings presented in Chapter 10, namely, that a belief in the gambler's fallacy leads to the expectation that the machines will pay out in 'hot' and 'cold' cycles. The hot periods are regarded as quite rare, perhaps lasting for only a few minutes, whereas 'cold' periods were generally of a longer duration, so that players could usually determine whether a machine was hot or cold relatively quickly. Typically, this involved looking for signs that the machine was about to pay out. Described in Chapter 10 (Table 10.7), these included: the occurrence of a large number of moderate sized wins in succession, the regular appearance of high-paying symbols (e.g., "You always feel hopeful when you get a black rhino to start with", Player 19), "I think I should go down to ...4 lines...but seeing that egg makes me jump up to 9", Player 1), or that the symbols appeared to be 'lining up', e.g., "Nothing's sticking together...The only thing it's paid on is the scatters." (Player 2), "It was all over the place that time" (Player 9).

As discussed in Chapter 10, these statements illustrate a second important bias, namely, the 'availability bias' (Corney & Cummings, 1985; Kahneman et al., 1982) which refers to people's tendency to base their expectations of events upon the frequency or nature of salient events. Slot machine players appear to use this bias as a

way of determining which stage of the 'cycle' has been reached. More recent or salient events are used to decide whether the machine is about to 'warm up' or 'go cold'. In this regard, this use of the bias is consistent with the predictions of Corney and Cummings who argued that:

> The extent to which positive outcomes are provided to the gambler, for example, total dollars paid out by a slot machine, heighten perceptions concerning the chance of winning (1983, p. 113)

In other words, as suggested in Chapter 10, representativeness or gambler's fallacy bias and the availability bias are not mutually exclusive. Instead, each bias is used in conjunction with the other. Whereas gambler's fallacy logic encourages the belief that wins are periodic or come in cycles, gamblers display an availability bias in the selection of information or evidence to support and maintain this hypothesis.

(c) *Personification of the Machine*

Another interesting finding to emerge from this study was that machines were not seen as passive devices. Instead, it was believed that machines actively monitored the amount of money provided each session and to each player so as to maintain the required payout rate. Too few wins, and the machine would pay out more; too many wins, and the machine would reduce the payout. Thus, as several players remarked in the post-experimental interview, it was important whenever one obtained a large win, to try to 'trick' the machine into 'thinking' that the rest of the session was being played by a new person. Otherwise, the machine would begin to decrease the payouts. This process was achieved in a variety of ways. One strategy was to take all one's coins out of the machine (Collect), walk away from the machine, and then resume playing, e.g., Player 17: "I collect it. Might trick the machine. Might pay out another big one." Another strategy was to alter one's playing style by playing at a different speed or using a different stake. This was used by Player 18: "Sometimes when you push another button...so you try another button. You almost feel that the machine can tell.", and also by Player 15: "Looks like someone else has been playing 5 lines. I normally don't like to play the same amount as some-one else has been playing...". However, the most usual strategy was observed in the behaviour of Player 12, who refused to

leave money in the payout tray because she feared that the machine would weigh the coins and 'conclude' that she was being paid more than she deserved.

This belief that machines monitor the progress of each game reflected a second type of irrational belief which emerged in this study: namely, what Ladouceur and Gaboury (1988), Griffiths (1994), Walker (1992b) have termed 'personalisation of the machine'. This occurs whenever players imbue the machine with human qualities. Although the most common form of personalisation involves the ascription of mood states, e.g. 'This one's a bit hungry I think", "Might be in a reasonable mood' (Player 15), '...I scared it', "I charmed it." (Player 12), 'This will...show how nasty machines can be." (Player 16), it was also found that players tried to strike bargains with the machines, or encourage it to play more fairly, e.g. "Come on. Give me something. Come on, give me prizes. Dirty stinker-after playing all that time!" "I think if I dare it, I might get something." (Player 1), 'Come on. Keep winning. You could do it again.", (Player 11), "I'm going to swap machines on you-I will go to your partner next door.", "Come on. Be good." (Player 12).

It could be argued that these statements are nothing more than colourful ways of describing the how the session is progressing. For example, terms such as 'nice' and 'good', 'nasty', 'bad' and 'hungry' might be alternative ways of saying that the machine is 'hot' and 'cold'. However, such statements might also imply the existence of a strong emotional bond between player and machine. Consistent with the explanation advanced by Griffiths (1994) in his study of regular slot-machine players, it could be argued that when players talk to machines, strike bargains or cajole them into paying larger wins, they are treating the machines as 'electronic friends'. Thus, according to this view, each session is not seen as a passive game, but a duel or competition between player and machine. Since games are meant to be fair, it follows that when players do not obtain a 'fair return' they feel angry and frustrated. They will feel that the machine 'owes them' or is 'cheating'. Interestingly, this trend was more strongly observed in women than men, suggesting that women may become more emotionally involved when they gamble. If this is so, it may be that the behaviour of women is maintained less by cognitive biases and more strongly by beliefs relating to the inherent 'fairness' of the activity; for example, that machines should reward players for their time and effort.

(d) *The Role of Near-Misses and Counterfactual Thinking*

One particular way in which machines were thought to display 'gamesmanship' was in the repeated presentation of outcomes which were very close to winning combinations: near-misses. Previous research by Griffiths (1990a), Reid (1986) and Strickland and Grote (1967) has suggested that these events may be almost as reinforcing as wins, and this was confirmed in this study. Verbalised statements showed that players' near-misses gave rise to considerable excitement and frustration: e.g., "Look at that. Why did you have to be there...That makes me wild, it does..You bastard, you dropped down" (Player 20), "This machine is just toying with me...that's pretty disgusting really." (Player 15), "They just won't line up. How frustrating!" (Player 14), "One more!...this is where I usually kick the machine." (Player 14), "I keep getting 5 bags, but I can't get them in a line!" (Player 6). As discussed in Chapter 4, such frustration can be explained in terms of Amsel's (1957) frustration theory which suggests that a failure to obtain desired rewards increases the strength of operant responses.

However, a more cogent explanation has been provided in terms of what Kahneman et al. (1982) have termed the 'simulation heuristic' (Gavanski & Wells, 1989; Gilovich & Husted-Medvec, 1994; Kahneman, Slovic & Tversky, 1982-see Chapter 4). This bias is based upon the notion that when people obtain outcomes very close to the one desired (e.g., One number off in a lottery), they find it very easy to imagine what 'might have happened' if things had been slightly different. By ruminating over 'what might have been', players may develop strong feelings of regret and disappointment, which can only be alleviated by further gambling. This may be because near-misses give rise to a sense of 'unfinished business' which has to be resolved before the person's mind it set to rest (Loftus & Loftus, 1983).

Although regret was usually expressed when desired machine events did not eventuate, players also appeared to experience regret when they missed opportunities resulting from the gambler's own behaviour. For example, when some players obtained moderate-sized wins, they expressed frustration for not having staked more on that turn. In addition, players were reluctant to gamble on fewer than five lines because they feared missing out on outcomes that occurred on other lines: "Yes..I should have upped the bet a bit more. I had a feeling that something would come out." (Player 1),

"What has been typical for me lately has been to play 3 lines until the eggs come out. Then again I do not want to miss out on the 5th line, just in case." (Player 1), "There does not look like there's much coming up...but sometimes you miss and you wish that you had bet on a few more lines." (Player 15). These results are consistent with those in Chapter 7 (Table 7.11) where 'not wishing to miss out on a large win' was found to be an important reason why poker machine players continued gambling when they were losing. This research also confirms the recent laboratory findings of Bar-Hillel and Neter (1996) which suggested that avoiding disappointment and regret may play an important role in maintaining gambling behaviour.

(e) *The Relationship between Behaviour and Cognitions*

In addition to elucidating the nature of cognitive biases used during gambling sessions, this study also provided many useful insights into the relationship between cognitive processes and gambling behaviour; in particular, which machine events were found to be most reinforcing. As reported in Chapter 10, players were found to decrease their response rates during intervals containing large wins, but maintained consistent response rates across intervals containing no wins and only small wins. It was pointed out that these results were inconsistent with previous research by Dickerson et al. (1991, 1992), who found that response increased during intervals containing small wins of less than 50 credits. Although this discrepancy was explained in terms of the different characteristics of the machines used in the present study, it was also argued that this result may also have related to differences is methodology, namely, the brevity of the sessions observed and the demand characteristics of the experiment (e.g., participants may have played consistently to satisfy the requirements of the experiment). Thus, in order to address this problem, transcripts of verbalised statements were consulted to examine players' responses to large events.

This analysis showed that the variations in response rates were reflected in the statements made by players during the session. Whereas players expressed considerable excitement when they obtained large wins, they generally greeted periods with only small wins with disappointment and contempt: "I only got 4" (Player 1), 'Wow, I got 4 for all that" (Player 6), "Little bits, little nibbles..Not very much happening." (Player 7), "It's only paying rubbish" (Player 15), "A whole 4!" (Player 16), "Win...2..whoopie" (Player 16). Indeed, players were just as likely to change machines

when they were obtaining no wins as they were when only small wins were being obtained. In other words, the difference between this study and Dickerson et al.'s appears to be related to the difference in the machine characteristics rather than the methodology that was used.

Furthermore, by comparing verbalised statements and the occurrence of machine events or player behaviour, it was possible to examine whether cognitive statements typically followed or preceded behaviour. This analysis showed that cognitive statements were unlikely to be merely ad hoc justifications for behaviour. Consistent with observations made by Walker (1992b), it was found that players frequently expressed their intentions prior to performing actions, e.g., "Now I collect it and usually what I do is put 60 in again." (Player 17), "I'll collect...might trick the machine." (Player 17), "I'll try 5, see if the scatters come up." (Player 16), "I'll pluck up and see what happens" (Player 16), "I'll play a few more...and then go back up." (Player 15), "I'm going to swap machines on you." (Player 12), "I think I will go down to 5...but seeing that egg [gold] makes me jump up to 9." (Player 1). Even more encouraging was the fact that players often made statements to the effect that their decisions were based upon pre-existing systems of logic. For example, players used phrases such as: 'What I usually do here...", "When this happens, you always think...", "I have a theory that...", "It's always an idea to...." implying that their behaviour in the experiment was representative of their normal behaviour, and based upon previous experience. This was further confirmed by post-session discussions with players in which it was found that they expressed very similar views, and endorsed the same irrational beliefs which they had employed during the sessions. Thus, it appears that cognitions do precede actions, rather than the other way around.

However, perhaps a more important question is not the timing of the cognitions, but whether they are necessary for the maintenance of behaviour. In other words, are players able to play without 'thinking about' their actions? Is it possible that the cognitions observed are the result of demand characteristics where players try to give explanations for actions which might otherwise be based upon well developed habits? This issue is a difficult one because it is impossible to know whether similar cognitive processes are used when players gamble outside of the experiment. However, there was evidence to suggest that cognitions do not play a major role in many people's

gambling. For example, the fact that several players (e.g., Players 5, 7, 8 14) found it difficult to think aloud when they were gambling, suggested that their behaviour was largely habitual and based upon their responses to the game, a view which is more consistent with the behavioural view propounded by Dickerson et al. (1991, 1992). Nevertheless, as Griffiths (1994) pointed out: in saying this, it is important to recognise that just because *current* behaviour did not appear to be maintained by cognitive processes, this does not necessarily imply that this was always so. Indeed, as he points out: it may be that "...increased experience in the act of gambling on fruit machines took it from being cognitively controlled to automatic, and that what is available to the novice may be unavailable to the expert." (p. 144). In other words, the fact that many regular and experienced players in this study said relatively little may reflect the fact that they no longer need to think about their gambling because of their familiarity with the activity. This was particularly likely in this present study because many of the players were aged over 40 years and had been playing poker machines for over ten years both in South Australian and in NSW (where poker machines have been legal for 40 years).

Thus, the value of cognitive approaches to gambling research are not necessarily diminished by these observations. On the contrary, it may be that drawing experienced players' attention to their behaviour, i.e., by making them think about it, may be a productive step towards alleviating their habit and allowing them to achieve greater control.

Summary and Conclusions

The results of this study show that Walker's (1992b) findings concerning the irrationality of gambling-related cognitions can be validly generalised from student gamblers to other gamblers in the community. Over seventy percent of cognitions expressing behavioural intentions or interpretations of events are irrational. This irrationality is consistently observed across gambling sessions and does not decrease when players are losing. However, the degree of irrationality does appear to be related to risk-taking, with greater irrationality observed in those who take greater risks, suggesting a causal link between irrationality and player confidence. Although results showed that these irrational statements were unlikely to be merely 'ad hoc' justifications for behaviour, doubts were raised about whether cognitions actually

maintain behaviour. Experienced players seemed capable of gambling with little cognitive involvement, and found it difficult to verbalise any thoughts at all, which would appear more consistent with the view advocated by Dickerson et al. (1991, 1992), namely that poker machine gambling is an operant behaviour maintained by schedules of reinforcement. Nevertheless, it was argued that this view does not rule out the possibility that cognitive processes play a role in the development of gambling habits, but that they become less salient over time.

This study also showed that the use of cognitive biases or heuristics may not be as indiscriminate as previous researchers (e.g., Griffiths, 1994; Wagenaar, 1988) have suggested. Players appear to share very similar theories about the operation of poker machines. Availability, simulation heuristics (counterfactual thinking) and representativeness biases are common features of poker machine gambling and appear to be systematically applied. For example, a belief in the gambler's fallacy appears to promote beliefs concerning the periodicity of winning or 'payout cycles', whereas the availability heuristic appears to be used when players attempt to 'decide' whether they should continue or discontinue using a particular machine. In addition, counterfactual thinking and regret resulting from missed opportunities appears to be an important factor in justifying a continuation of behaviour. As a result, this study provides considerable support for recent suggestions by Griffiths (1993e, 1995a), Walker (1992a), Ladouceur and Walker (1996) that cognitive therapies, based upon teaching players the true odds and probabilities and 'blocking' irrational thoughts, are likely to be of considerable value in treating excessive slot machine gambling.

Chapter 12

Summary and Conclusions

12.1 Overview

As discussed in Chapter 1, this project had six major objectives: (a) To obtain baseline data concerning the level of gambling participation in South Australia, (b) To identify the characteristics of those who gamble, (c) To ascertain the percentage of people in South Australia experiencing problems related to their gambling, (d) To understand people's motivations for, and perceptions of, gambling activities, (e) To examine the within-session characteristics of gambling behaviour, and finally: (f) to examine the implications of this work for assisting Government policy and also the development of intervention strategies to assist those who gamble excessively. These research objectives were based upon an approach previously suggested by Brown (1986), Walker (1992a), Dickerson (1995) and Griffiths (1995a), namely, that gambling research should be 'eclectic' or multi-dimensional in design, with attention devoted not only to the nature of gambling behaviour, but also to its causes and effects. In this project, this was achieved using a combination of survey and experimental research conducted in both field and laboratory settings, using both random and selective sampling techniques. This approach made it possible to examine the relationship between self-reported beliefs and motivations and actual gambling behaviour, and also to compare the characteristics of those gamblers selected randomly from the population with those obtained in volunteer samples. The purpose of the current chapter is to summarise the key findings of this research, and also to consider their implications for intervention strategies and future studies.

12.2 Gambling Participation in South Australia (Objective 1 and 2)

The results reported in Chapter 5 showed that South Australia has a lot in common with the other Australian States. Approximately 80% of South Australians gamble at least once per year, and 32% percent gamble once per week or more often. The most popular type of gambling in South Australia was Lotto which was played by almost 60% of the population, with 44% of those who played reporting having bought tickets

at least once per week. This was followed by poker machine gambling, which attracted 42% of the sample, bingo games (36%), horse racing (19%) and keno (15%). All other activities were generally associated with lower levels of participation ranging from 4% for sports-betting to 8% for card and dice games.

Based upon these participation data it was possible, using factor analysis, to examine the structure of the South Australian gambling market. This analysis was used to test the hypothesis that the pattern of preferences would correspond to the structural characteristics outlined in Chapter 2, specifically, the dimensions identified by Solonsch (1991b). Activities classed as continuous (i.e., with a short interval between wager and outcome) and those involving a greater level of player involvement (i.e., physical, emotional or cognitive involvement) would occupy a similar place in the market because each satisfied similar motivations for gambling. Unfortunately, as shown by Table 5.11, the results provided little support for this notion, with non-continuous activities (e.g., lotteries) found to load on the same factor as continuous activities (e.g., poker machines). However, there was some limited support for the idea that involvement influences preferences. Activities involving a greater level of cognitive involvement tended to load on the same factors (e.g., Factor 1: video cards, card and dice games, Factor 3: racing activities, sports-betting), whereas a third factor (Factor 2) attracted higher loadings for chance activities such as lotteries, poker machines and bingo. Accordingly, it was suggested that the gambling market appears to be based upon a broad 'skill-chance' dimension, with people who play one type of skilled or chance activity also likely to play other activities with similar characteristics. In this regard, these results appear to be consistent with recent research by Chantal, Vallerand and Vallieres (1994, 1995) and Chantal and Vallerand (1996) who have also emphasised the importance of this dimension in relation to broad differences in gambling motivation.

From the results of the logistic regression analyses provided in Table 5.10, it was concluded that this dimensional structure appears to be related to a small number of consistent demographic differences in gambling preferences, namely, the differences attributable to gender and age. Younger people and men found significantly more likely to gamble on skilled activities than older people and women, who tended to confine their preferences to chance activities. As a result, it was suggested that if one

could understand the factors underlying these age and gender differences, this would be a significant step towards understanding the nature of the gambling market as a whole. This task was attempted in Study 3 (Chapter 7), which examined the relationship between gambling motivations and age and gender using a sample of Casino gamblers.

In Study 3, a number of theories were investigated, including whether these demographic differences were related to differences in motivation (e.g., whether younger people and men base their gambling more upon skill and luck), and the accessibility of skilled activities to older people and women. A series of questions relating to the use of skill and luck in gambling were posed: for example, whether people typically used luck or skill when they gambled; whether they perceived activities as involving skill; their attributions for success; and their motivations for continuing to gamble. The results showed no age or gender differences in how they perceived the activities (i.e., on a skill-chance dimension). However, younger people were significantly more likely to gamble to win money (Table 7.9), and men were significantly more likely to employ strategies when they gambled, to read books on how to win, and to attribute their success to skill (Table 7.10). Furthermore, when women were asked why they avoided a certain skilled activity (i.e., blackjack) many of them responded that they disliked the fact that the activity required 'too much skill and concentration'. Therefore, it was suggested that gender and age differences in participation appear to be related to gambling motivation; in particular, the extent to which people see gambling as a challenge rather than an amusing pastime.

While it is acknowledged that social desirability responding may have influenced these responses, the results are nonetheless sufficiently encouraging to suggest that further research into age and gender is required. For example, while these differences appear to be related to variations in people's preferences for skilled and chance tasks, the origins of preferences still remain unknown. There are several theories which have been advanced to explain these differences (see Section 3.6), including differences in child and adolescent play behaviour or activity preferences, women's reluctance to participate in activities traditionally identified as masculine, and differences in gambling motivation, but none of these theories has been comprehensively investigated. Therefore, it remains unclear whether research is better directed towards

understanding the behaviour of people who are already gambling, or towards studying the development of gambling preferences using research involving children or adolescents. Nevertheless, it is suggested that, given the recent findings of Ladouceur et al. (1994) which have found that primary school children differ very little in their preferences for gambling activities, further research into adolescent gambling is required. This is because of the consistent finding that adult variations in gambling preferences appear to emerge during adolescent years (Acuri, Lester & Smith, 1985; Fisher, 1993, 1995; Griffiths, 1989, 1995a, c).

Unfortunately, a limitation of most published studies of adolescent gambling is that they are usually based upon cross-sectional data, making it difficult to identify the antecedents and development of gambling behaviour. For example, are children who gamble during primary school more likely to gamble during adolescence, and in adulthood? Consequently, it may be of interest to conduct a longitudinal study in South Australia that obtains baseline measures of gambling behaviour for a sample of adolescents (aged 13-15 years) and then conduct follow up studies every 1-2 years. Of particular interest would be factors that influence people's involvement with gambling, e.g., changes in family structure, the formation of new social groups, decreases in psychological well-being or school performance, and also whether an involvement in gambling during adolescence is related to subsequent psychological, social or vocational functioning during adulthood.

12.3 Problem Gambling in South Australia (Objective 3)

The importance of adolescent research was also confirmed by the results reported in Study 2 (Chapter 6), which showed that the highest incidence of gambling-related problems was observed in single, unemployed people aged 18-24 years. This finding was generally consistent with previous studies conducted in other States by the Australian Institute for Gambling Research (Dickerson et al., 1994, 1995, 1996) and also recent research by Volberg in the United States (Volberg, 1997). However, these results contrast with reports from South Australian service agencies which have found that most people seeking assistance for gambling-related problems were generally much older (Department of Treasury and Finance, 1995). Thus, an important finding from this study is that the people who are seeking assistance for gambling-related

problems in South Australia might not be representative of the problem gamblers in the community. Younger people, most likely, younger males appear to be more reluctant to seek assistance for their problems than older members of this community, and this may have important implications for the way in which intervention services are promoted and implemented.

In relation to the total number of problem gamblers estimated by the study, the results were generally consistent with predictions. The prevalence rate was lower than in New South Wales, which has one of the highest per capita expenditures on gambling, but significantly higher than the rates observed in Tasmania and in Western Australia, both of which had no poker machines in clubs and hotels at the time when the surveys were conducted. Thus, this study confirms that the introduction of poker machines to South Australia in July 1994 appears to be the major reason why the prevalence rate in this State is greater than in Western Australia.

This was further confirmed by the findings of the study reported in Chapter 6 which investigated the relationship between the incidence of gambling-related problems study and types of gambling. At the most general level, this study confirmed the previous findings of Dickerson et al. (1997), namely, that gambling-related problems are more likely to be associated with continuous forms of gambling such as racing and poker machines rather than less continuous activities such as lotteries. But, more specifically, this study confirmed the observations of local welfare agencies that most gambling-related problems (approximately 60%) are related to poker machine gambling (Department of Treasury and Finance, 1995). However, contrary to popular opinion, it was found that poker machine gambling was no more likely to be associated with problem-gambling than other continuous forms of gambling, such as horse racing, when differences in participation were controlled. This finding suggests that the effects of 'other' continuous types of gambling may be underestimated in South Australia, and that focussing only on one type of gambling (i.e., poker machines) may be an unwise approach to adopt. Despite the common assumption that problem gamblers share many of the same characteristics (Lesieur & Blume, 1987; Lesieur & Rosenthal, 1991), this assumption may not be valid (Allcock, 1995; Walker, 1995, 1997). Two gamblers, both of whom satisfy the DSM-IV or SOGS criterion for 'pathological gambling', might experience a different range of problems and symptoms.

Support for this contention was obtained in Study 2 which found several significant differences between the problems experienced by poker machine and racing gamblers (Table 6.7a). Racing gamblers were significantly more likely to have borrowed money to gamble, whereas poker machine players were more likely to have gambled more than they could afford. These differences are consistent with the data presented in Chapter 6 (Figure 6.1) which showed that racing activities tend to involve a greater per session expenditure, and also reflects the different structural characteristics of the two activities. Poker machine gambling is a considerably more rapid type of gambling than racing and, as Dickerson (1993) suggests, this increases the likelihood of impaired control which takes the form of an inability to stop gambling after having spent more than could be afforded. This suggests that service agencies may need to vary the nature of the service provided to the two types of gambler. Debt management is likely to be more commonly required when assisting racing gamblers, whereas poker machine gamblers are perhaps more likely to require assistance for short-term problems, such as the inability to pay bills and other household expenses.

12.4 Motivations for Gambling (Objective 4)

Having ascertained the prevalence of gambling in South Australia, a further aim of this research was to consider why people gamble; in particular, why they gamble on poker machines, an activity which offers players no objective way to influence the outcomes, nor any expectation of long-term profit. In order to allow comparisons, Study 4 (Chapter 8) was based upon previous research by Griffiths (1995b). The results were generally consistent with Griffiths' findings and showed that poker machine players gamble for a variety of reasons including: for the excitement, for enjoyment, for relaxation and to alleviate negative mood states. However, as previously noted by Walker (1992a), the results also highlighted several differences between UK fruit machine gamblers and the poker machine players in this study. Although both groups shared similar motivations for gambling, poker machine players were significantly less likely to believe that skill could be used to influence outcomes. This suggests that Australian gamblers are unlikely to persist with poker machine gambling because they cannot exert any direct control over the outcomes (c.f., 'primary control'- Rothbaum et al., 1982). Instead, as will be discussed below, it

appears more likely that persistence on Australian poker machines is related to false beliefs about the nature of randomness and probability; specifically, beliefs relating to the extent to which players can predict the sequence of outcomes.

This study also examined the mood states generally experienced by poker machine players before, during and after gambling. The results of this analysis showed that, while most Australian poker machine players typically begin sessions in a good mood, they sometimes experience negative symptoms when they cease gambling. This appears to be the result of frustration and disappointment associated with losing, rather than the effects of reduced physiological arousal, or withdrawal, as has been suggested by Griffiths (1995b). In comparison to Griffith's fruit machine players, poker machine players were significantly less likely to experience negative mood states while they were gambling.

It is not clear why this difference emerged but one possibility suggested in Chapter 8, is that it is related to differences in motivation. Since motivations to win money are negatively related to age (Chapter 7, 8), it is possible that Griffiths' younger sample might have considered this motivation as being more important, and thus would become more frustrated and disappointed when they failed to achieve this goal. Although a similar percentage of players in both samples endorsed 'winning' money as an important motivation, Griffiths' study did not include a rating scale. Thus, it is not possible to compare the relative importance ascribed to this motivation. Nevertheless, it would be of interest in future research to examine the relationship between motivations for gambling and mood states experienced during gambling, especially given that previous research (e.g., Burger, 1984; Burger & Arkin, 1980; Wortman & Brehm, 1975) has found that people with higher expectations of success or personal control are more likely to experience depression when they fail to succeed.

12.5 The Within-Session Characteristics of Poker Machine Gambling (Objective 5)

A final important objective of this research was to examine the factors associated with the maintenance of ongoing behaviour. This research was undertaken in the studies presented in Chapters 9, 10 and 11, which considered the value of two contrasting theories: operant conditioning, as previously investigated by Dickerson et

al. (1991, 1992) and cognitive theory, previously investigated by Ladouceur et al. (1984, 1986, 1988, 1991), Griffiths (1990b, 1994) and Walker (1988, 1992b). The results of these three studies provided support for both perspectives, although it was suggested that each may have greater applicability to different aspects of gambling behaviour.

12.5.1 The Role of Operant Conditioning

Study 5 (Chapter 9) and 6 (Chapter 10) supported previous research by Dickerson et al. (1991, 1992) which has suggested that a greater involvement with gambling is associated with an increasing stereotopy of the habit. Whereas Dickerson et al. have shown (using older style machines) that response rates appear to be sensitive to the nature of machine events, the present study extended this finding by showing that this stereotopy also applies to the staking of bets and to expectancies for winning. In particular, while all players have been found to decrease their responses in relation to large wins, regular players are also significantly less likely to alter their stakes and expectancies of winning, and also increase their stakes in more consistent ways. In accordance with operant principles, bet increases tend to follow wins, decreases tend to follow losses. This implies that the more people gamble on slot machines, the more their behaviour is influenced by events outside the player's control, which is consistent with Dickerson's (1993) suggestion that a high level of involvement with continuous forms of gambling gives rise to a greater likelihood of 'impaired control' over behaviour. These findings also support Griffiths' (1994) suggestion that regular slot-machine players appear capable of gambling without having to attend to what they are doing . As Griffiths observed:

> ...regular players...minds went black in behavioural terms...This was probably because these regular gamblers were on 'automatic pilot' in that they could gamble on fruit machines without attending to what they were thinking about...It could also be the case that increased experience in the act of gambling on fruit machines took it from being cognitively controlled to automatic... (1994, p. 364).

If one accepts the suggestion that regular slot machine gambling is largely operantly based, this has important implications for policy-makers and the gambling industry. Specifically, if behaviour is influenced by machine events, it follows that modifications

of machine characteristics can be used to reduce the attraction of slot machines, making them 'safer' for players. Some of these design modifications have recently been suggested in South Australia, including: that the machines should 'shut off' following a large win so that players are given some time to relax and consider what they will do with their winnings, or the incidental reinforcements, which accompany winning outcomes (e.g., music and flashing lights) should be reduced. Similar changes have also been proposed in Europe by the Nijpels Committee (Remmers, 1997), and these include: a reduction in autoplay features, a reduction in the size of the credit total which can be stored on the machine, a reduction of speed with which people can play (e.g., to a minimum rate of 3.5 seconds between spins), and also more conservative lighting and sound features.

Unfortunately, the results of the present project suggest that these techniques are unlikely to be of great value. For example, the fact that players pause after large wins anyway, and the tendency of players to move to another machine when they have obtained a jackpot suggests that introducing pause features may be of limited value, and may only increase the level of frustration and anticipation associated with playing. Furthermore, changes to the sound and light effects will be of limited value if the machines are located close to one another. Players will still be able to see, or hear, the successes of other players and obtain vicarious reinforcement. However, the suggestion that maximum credit totals should be imposed may be of value, given that regular players have a tendency to increase their bets whenever they are winning. By forcing players to stop and insert more coins so that they can stake the maximum number of credits (90 credits in South Australia), and also by showing how much they have won in coins (presumably the credits will be paid into the tray), players may be more likely to take their winnings and discontinue gambling. Finally, the recommendation that play-rates should be restricted to one play every 3.5 seconds seems inconsistent with the fact that most regular players gamble more slowly than this, usually making 1 response every 5 seconds (see chapter 10, 11, Dickerson et al., 1992). Thus, based upon this research, it is suggested that response rates would need to be slowed to a maximum of 1 every 6 seconds in order to have a significant effect upon the speed with which people can lose money. It is also suggested that policy-

makers will need to ensure that a slowing of response rates is not also associated with a concomitant increase in the amount staked per spin.

At the present time, there is little research which has examined the effects of variations in machine characteristics upon gambling behaviour. Although a recent study by Haw (1997) has shown how structural characteristics (e.g., machine denomination, number of payout lines) influence gambling expenditure, it is still unclear how variations in machine features (e.g., bonus sequences, frequency of reinforcement, average win size) influence the popularity of machines, the rate of response, or the persistence of behaviour. For example, if machines are required to pay out a standard return of 87%-90%, there is likely to be a trade-off between the frequency and average size of the wins provided. Those machines which pay out wins very frequently are less likely to pay out larger wins, whereas those which pay out wins infrequently are likely to pay out larger wins. Thus, it would be of interest to determine which type of machine is most popular, and whether variations in these characteristics influence the type of gambler. It may be, for example, that the most popular machines are those which provide players not only with relatively frequent wins, but which also provide wins of a reasonable size. Such a machine would be able to maintain the players' interest for longer, while also providing some element of excitement.

12.5.2 The Role of Cognitive Processes

Although reinforcement schedules and machine characteristics may influence gambling behaviour, this research further suggests that cognitive processes may also be important. As found in Chapter 10 and 11, players appear to share very similar views about the way in which machines are programmed. Specifically, rather than seeing outcomes as randomly determined, players believe that the machines pay out in cycles. On each machine there is a short 'hot' period during which wins are paid out frequently, and also a longer 'cold' period in which only small wins will be obtained. This belief appears to be based upon the well-known gambler's fallacy (Cohen, 1972; Kahneman & Tversky, 1972; Wagenaar, 1988; Winefield, 1966) which suggests that short-term deviations from long-run expected outcomes will be corrected by the machine to maintain the correct rate of return. If too many wins occur, the machine will decrease the rate of return; too many losses, and the machine will increase the rate

of return. Consequently, it is believed that if one can identify the point in the cycle which has been reached, players can enhance their chances of success by avoiding 'cold' machines and playing 'hot' machines. [1]

As discussed in Chapter 10 and 11, it is evident that this belief underlies many of the irrational behaviours observed in poker machine players (see Table 10.7). Since players expect that some periods are more likely to be productive than others, they develop strategies or techniques which allow them to assess the productivity of machines. Many of these behaviours were quite idiosyncratic, but there were several which were observed in a number of players, including the tendency to drop coins into the coffer to see if it sounded empty, not to play any machine which had just paid out a large amount, or swapping machines after having failed to obtain a reasonable win after only a few spins. Walker (1992a) has suggested that these irrational behaviours and beliefs may be central to the maintenance of slot machine gambling; however, as he concedes, there is so far insufficient evidence to draw any confident conclusions.

Although previous research by Griffiths (1994) has shown that regular players tend to be more irrational than non-regular players, it is still unclear how these irrational thoughts are related to this difference in involvement. Neither is it clear whether irrational thinking is related to the development of gambling-related problems. Instead, it is possible that the difference observed by Griffiths is associated with the demand characteristics of the study, namely, the fact that regular players have a wider repertoire of experiences or expressions to draw upon when they are asked to verbalise their thoughts. Such thoughts may play little role outside of the experiment, and are only produced because the person can think of nothing else to say. Indeed, in Chapter 11, it was suggested that this problem of demand characteristics may be particularly likely to occur when conducting studies using student gamblers. This is because students are better able to produce logical and creative explanations for their behaviour when asked to participate to obtain course credit. Consequently, it was suggested that further studies comparing the verbalisations of student and non-student gamblers, matched using a measure of verbal fluency, might be of considerable value to confirm the validity of this research.

---

[1] As Toneguzzo (1997) has pointed out, these beliefs are completely false. In Australia, all machines are based upon random number generators which ensure that each outcome is independent of the one that preceded it.

Nevertheless, the study in Chapter 11 showed that the cognitions expressed during the experimental sessions appeared to be based upon pre-existing sets of logic and were similar to beliefs expressed in post-experimental interviews. Accordingly, it was concluded in Chapter 11 that not all beliefs expressed were likely to be associated with social desirability responding or the demand characteristics of the experiment. While some irrational beliefs (e.g., bringing along lucky charms, rubbing the machine) were probably unrelated to the persistence of behaviour, other beliefs such as the gamblers' fallacy described above appear to be important motivating factors in persistent behaviour. Because gamblers believe that machines will eventually pay out, they continue on the same machine. Alternatively, if they think the machine is cold, they swap machines and become increasingly frustrated when this expectation of winning has not been fulfilled. Such behaviours are likely to give rise to entrapment in the form of a desire to justify previous effort and expenditure, and also an increasing fear of 'missing out', which can only be resolved by further gambling.

While these ideas are to some extent speculative, Walker (1992a) and Ladouceur and Walker (1996) nonetheless believe that there is sufficient evidence available for cognitive beliefs to be considered an important target for: (a) intervention strategies for individual gamblers, and (b) community education. This first possibility is currently being investigated by Walker (1996) and appears to be providing very promising results. The cognitive therapy being used is based upon the standard principles of cognitive-behavioural therapy and involves two stages: firstly, an identification of the aberrant beliefs which the gambler holds about the activity, and secondly, a process of 'cognitive-restructuring' to draw attention to the irrationality of the beliefs. Gamblers are taught the true odds of the game; are instructed to believe that the events are not independent; told that the activity is unprofitable, and that attempts to predict or influence the outcomes are without value. Gamblers are taught how to 'block' irrational thoughts (e.g., that they can win), and how to replace these irrational thoughts with rational ones (e.g., 'I should take my winnings and leave', 'I cannot win', 'It's all chance').

Walker (1992a) has argued that these irrational thoughts can be identified in sessions or interviews conducted away from the gambling session. However, as suggested in Chapter 11, this may not always be possible given that many irrational beliefs are

highly idiosyncratic and context-bound. Many of these beliefs or behaviours may not be reported in interviews because players cannot remember what they do when they are gambling, and some behaviours may only be evident when the person is observed gambling. Thus, it is suggested that cognitive interventions should be based upon not only information from interviews, but also from recordings of irrational verbalisations produced during gambling sessions. Indeed, this technique has recently been advocated by Griffiths (1993e) who suggests that allowing fruit machine players to listen to tape-recordings of their irrational beliefs may be a useful form of therapy. In this regard, Griffiths' comments are in line with the discussion in Chapter 11, in which it was suggested that drawing gamblers' attention to their behaviour, by making them think about their decisions might also be of considerable value.

Finally, research into the role of irrational thinking may have important implications for community education. In South Australia, for example, it has been suggested that poker machine venues be required to erect signs next to every machine indicating the rate of return available on each machine, the last time it paid a jackpot, and also details of how the machine is programmed. Although this objective has partially been fulfilled by the development of 'how to play' booklets for players ('Smart-Play', McGregor, 1996), there is little evidence available as to whether hotel patrons are reading this information and whether it is serving the purpose that was intended. Thus, a more direct education or means of promotion may need to be developed. Although more extensive studies of the role of irrational thinking and of gambling attitudes are clearly required to justify these suggestions, it is hoped that the present research project will provide a useful starting point for the development of these policy initiatives, and also be of value to South Australian service agencies which may lack information concerning the nature of everyday gambling behaviour.

References:

Aasved, M.J. & Schaefer, J.M. (1995). 'Minnesota slots': an observational study of pull tab gambling. *Journal of Gambling Studies*, 11, 311-341.

Abramson, L., Seligman, M.E.P., & Teasdale, J.D. (1978). Learned helplessness in humans: critique and reformulation. *Journal of Abnormal Psychology*, 87, 49-74.

Abbott, M.W., & Volberg, R.A. (1996). The New Zealand survey of problem and pathological gambling. *Journal of Gambling Studies*, 12, 143-160.

Abt, V., & Smith, J.F. (1984). Gambling as play. *Annals of the American Academy of Political and Social Sciences*, 474, 122-132.

Abt, V., Smith, J.F., & McGurrin, M.C. (1985). Ritual, risk, and reward: a role of analysis of race track and casino encounters. *Journal of Gambling Behavior*, 1, 64-75.

Adler, A. (1930). Individual psychology, in C. Murchinson (Ed.) *Psychologies of 1930.* Worcester, Mass.: Clark University Press.

AGB McNair (1992). *Community Gambling Patterns*, Victorian Casino and Gaming Authority.

AGB McNair (1995). *Community Gambling Patterns*, Victorian Casino and Gaming Authority.

Allcock, C.C. (1985). Psychiatry and gambling-Dostoevsky to DSM III. In G.T. Caldwell, M.G. Dickerson, & L. Sylvan (Eds.). *Gambling in Australia*, Sydney: Croom Helm.

Allcock, C.C. (1986). Pathological gambling. *Australian and New Zealand Journal of Psychiatry*, 20, 259-265.

Allcock, C.C. (1995). Some ponderings on pathological gambling: an introspective essay, in J. O'Conner (Ed.) *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Allcock, C.C. & Grace, D.M. (1988). Pathological gamblers are neither impulsive nor sensation-seekers. *Australian and New Zealand Journal of Psychiatry*, 22, 307-311.

Allen, P. (1992). *Inquiry into the social impact of the extension of video gaming machines beyond casinos in Tasmania*, Tasmanian Council of Social Service Inc.

Alloy, L.B. & Abramson, L.Y. (1979). Judgement of contingency in depressed and nondepressed students: sadder but wiser? *Journal of Experimental Psychology: General*, 108, 441-485.

Alloy, L.B. & Abramson, L.Y. & Viscusi, D. (1981). Induced mood and the illusion of control. *Journal of Personality and Social Psychology*, 41, 1129-1140.

American Psychiatric Association (1980). *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III), Washington DC.

American Psychiatric Association (1987). *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)*, Washington DC.

American Psychiatric Association (1990). *Diagnostic and Statistical Manual of Mental Disorders (DSM IV)*, Washington DC.

Amsel, A. (1958). The role of frustrative noreward in noncontinuous reward situations. *Psychological Bulletin*, 55, 102-117.

Anderson, G., & Brown, R.I.F. (1984). Real and laboratory gambling, sensation-seeking and arousal, *British Journal of Psychology*, 75, 405-410.

Anderson, G., & Brown, R.I.F. (1987). Some applications of reversal theory to explanations of gambling and gambling addictions. *Journal of Gambling Behavior*, 3, 187-189.

Arcuri, A.F., Lester, D., & Smith, F.O. (1985). Shaping adolescent behavior. *Adolescence*, 20, 935-938.

Arenson, S.J. (1978). Age and sex differences in the probability preferences of children. *Psychological Reports*, 43, 697-698.

Anderson, G. & Brown, R.I.F. (1987). Some applications of reversal theory to the explanation of gambling and gambling addictions. *Journal of Gambling Behavior*, 179-189.

Arkes, H.R., Joyner, C.A. & Pezzo, M.V. (1994). The psychology of winfall gains. *Organizational Behavior and Human Decision Processes*, 59, 331-347.

Atlas, G.D. & Peterson, C. (1990). Explanatory style and gambling: how pessimists respond to losing wagers. *Behavioral Research Therapy*, 6, 523-529.

Australian Bureau of Statistics (1995). *Estimated resident population by sex and age, States and Territories of Australia.*

Baddeley, A. (1981). The cognitive psychology of everyday life. *British Journal of Psychology*, 72, 257-269.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.

Baron, E., Dickerson, M., & Blaszczynski, A. (1995). 'The scale of gambling choices': preliminary development of an instrument to measure impaired control of gambling behaviour. In J. O'Conner (Ed.) *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Bar-Hillel, M. & Neter, E. (1996). Why are people reluctant to exchange lottery tickets? *Journal of Personality and Social Psychology*, 70, 17-27.

Baudot, J.C. (1988). *Slot machines of Europe and America*. Kent, England: Costello.

Bauer, R.H. & Turner, J.H. (1974). Betting behavior in sexually homogenous and heterogenous groups. *Psychological Reports*, 34, 251-258.

Becona, E. (1991). The prevalence of pathological gambling in Galicia (Spain). Paper presented at the Annual Conference of the Society for the Study of Gambling, London.

Becona, E., & Fuentes, M.J. (1994). Pathological gambling evaluated by the South Oaks Gambling Screen. Paper presented at the 23rd International Congress of Applied Psychology, Madrid.

Bergler, E. (1957). *The Psychology of Gambling*. New York: Hill and Wang.

Berlyne, D.E. (1960). *Conflict, arousal and curiosity*. New York: McGraw-Hill.

Beyer, S. (1990). Gender differences in the accuracy of self-evaluations of performance. *Journal of Personality and Social Psychology*, 59, 960-970.

Blanche, E.E. (1950). Gambling odds and gimmicked. *Annals of the American Academy of Political and Social Sciences*, 269, 77-80.

Blascovich, J., Veach, T.L., & Ginsburg, G.P. (1973). Blackjack and the risky shift. *Sociometry*, 36, 42-55.

Blaszczynski, A. (1996). 'A History of Gambling'. Paper presented at the National Conference on Gambling, St.Edmund's Private Hospital and IPS Employee Assistance, Sydney.

Blaszczynski, A.P., Buhrich, N. & McConaghy, N. (1985). Pathological gamblers, heroin addicts and controls compared on the EPQ 'addiction scale'. *British Journal of Addiction*, 80, 315-319.

Blaszczynski, A.P., Wilson, A.C. & McConaghy, N. (1986). Sensation seeking in pathological gambling. *British Journal of Addiction*, 81, 113-117.

Blaszczynski, A. & McConaghy, N. (1989). Anxiety and/ or depression in the pathogenesis of addictive gambling. *International Journal of the Addictions*, 24, 337-350.

Blaszczynski, A.P. & McConaghy, N., & Frankova, A. (1990). Boredom proneness in patho- logical gamblers, *Psychological Reports*, 67, 35-42.

Blaszczynski, A.P. & McConaghy, N., & Frankova, A. (1990). Control versus abstinence in the treatment of pathological gambling: a two to nine year follow up. *British Journal of Addiction*, 86, 299-306.

Blaszczynski, A., Walker, M., Sagris, A., & Dickerson, M. (1997). *Psychological aspects of gambling paper*. Position paper prepared for the Directorate of Social Issues, Australian Psychological Society.

Blume, S.B. (1987). Compulsive gambling and the medical model. *Journal of Gambling Behavior*, 3, 237-247.

Bolen, D.W. & Boyd, W.H. (1968). Gambling and the gambler. *Archives of General Psychiatry*, 18, 617-630.

Bouts, P. & van Avermaet, J. (1992). Drawing familiar or unfamiliar cards: stimulus familiarity, chance orientation, and the illusion of control. *Personality and Social Psychology Bulletin*, 18, 331-335.

Boyd, W. (1982). Excitement: the gambler's drug. In W.R. Eadington (Ed.) *Gambling papers*. Springfield, Illinois: Charles C. Thomas Co.

Branchy, L., Shaw, S., Leiber, C.S. (1981). Ethanol impairs tryptophan transport into the brain and depresses serotonin. *Life Sciences*, 29, 2751-2755.

Brebner, J. (1983). A model of extraversion. *Australian Journal of Psychology*, 35, 349-359.

Brebner, J., & Cooper, C. (1974). The effect of a low rate of regular signals upon the reaction times of introverts and extraverts. *Journal of Research in Personality*, 8, 263-276.

Breen, R.B. & Frank, M.L. (1993). The effects of statistical fluctuations and perceived status of a competitor on the illusion of control in experienced gamblers. *Journal of Gambling Studies*, 9, 265-276.

Brenner, G.A., & Brenner, R. (1987). Cited by Walker (1992a). *The psychology of gambling*. Pergamon Press, Sydney.

Brockner, J., Shaw, M.C. & Rubin, J.Z. (1979). Factors affecting withdrawal from an escalating conflict: quitting before it's too late. *Journal of Experimental Social Psychology*, 15, 492-503.

Brown, R.I.F. (1986). Arousal and sensation-seeking components in the general explanation of gambling and gambling addictions. *International Journal of the Addictions*, 21, 1001-1016.

Brown, R.I.F.(1987). Models of gambling and gambling addictions as perceptual filters. *Journal of Gambling Behavior*, 3, 224-236.

Browne, B.R. (1989). Going on tilt. *Journal of Gambling Behavior*, 5, 3-21.

Browne, B.A. & Brown, D.J. (1993a). Predictors of lottery gambling among American college students. *Journal of Social Psychology*, 134, 339-347.

Browne, B.A. & Brown, D.J. (1993b). Using students as subjects in research on state lottery gambling. *Psychological Reports*, 72, 1295-1298.

Bruce, A.C. & Johnson, J.E.V. (1994). Male and female betting behavior. *Journal of Gambling Studies*, 10, 183-198.

Burger, J.M. & Cooper, H.M. (1979). The Desirability of Control. *Motivation and Emotion*, 3, 381-393.

Burger, J.M., & Arkin, R.M. (1984). Prediction, control and learned helplessness. *Journal of Personality and Social Psychology*, 38, 482-491.

Burger, J.M. (1984). Desire for control, locus of control, and proneness to depression. *Journal of Personality*, 52, 71-89.

Burger, J.M. (1989). Negative reactions to increases in perceived personal control. *Journal of Personality and Social psychology,* 56, 246-256.

Burger, J.M. (1991). The effects of desire for control in situations with chance determined outcomes: gambling behaviour in lotto and bingo players. *Journal of Research in Personality*, 25, 196-204.

Burger, J.M., & Cooper, N.G. (1985) Desire for control and gambling behavior among problem gamblers. *Personality and Social Psychology Bulletin*, 11, 145-152.

Burger, J.M. & Schnerring, D.A. (1982). The effects of desire for control and extrinsic rewards on the illusion of control and gambling. *Motivation and Emotion*, 6, 329-335.

Burger, J.M. & Smith, N.G. (1985). Desire for control and gambling behavior among problem gamblers. *Personality and Social Psychology Bulletin*, 11, 145-152.

Caldwell, G.T. (1974). The gambling Australian. In D.E. Edgar (Ed.). *Social Change in Australia*, Melbourne: Cheshire.

Caldwell, G.T. (1985). Some historical and sociological characteristics of Australian gambling. In G.T. Caldwell, Dickerson, M.G., B. Haig, B., and L. Sylvan (Eds.). *Gambling in Australia.* Sydney: Croom Helm.

Carlton, P.L. & Manowitz, P. (1987). Physiological factors as determinants of pathological gambling. *Journal of Gambling Behavior*, 3, 274-285.

Carroll, D. & Huxley, J.A. (1994). Cognitive, dispositional, and psychophysiological correlates of dependent slot machine gambling in young people. *Journal of Applied Social Psychology*, 24, 1070-1083.

Casey, M., & Morrissey, S. (1992). *The social impact of gambling: a literature review*, Victoria Gaming Commission.

Ceci, S.J. & Liker, J.K. (1986). A day at the races: a study of IQ, expertise, and cognitive complexity. *Journal of Experimental Psychology: General*, 115, 255-266.

Chantal, Y., Vallerand, R.J. & Vallieres, E.F. (1995). Motivation and gambling involvement. *Journal of Social Psychology*, 135, 735-763.

Chantal, Y., & Vallerand, R.J. (1996). Skill versus luck: a motivational analysis of gambling involvement. *Journal of Gambling Studies*, 12, 407-418.

Chantal, Y., Vallerand, R.J., Ladouceur, R. & Ferland, F. (1995). How close is close enough? Near misses perceptions and gambling. Paper presented at the American Psychological Association Annual Convention, Toronto, Canada.

Chapanis, A. (1967). The relevance of laboratory studies to practical situations. *Ergonomics*, 10, 557-577.

Cheung, Y.H. (1997). On the rationality of people faced with gambles with relative large payoffs. Paper presented at the Eighth Annual Conference of the National Association for Gambling Studies, Melbourne, Victoria.

Cocco, N., Sharpe, L. & Blaszczynski, A. (1995). Differences in preferred level of arousal in two sub-groups of problem gamblers: a preliminary report. *Journal of Gambling Studies* 11, 221-229.

Cohen, J. (1972). *Psychological probability or the art of doubt*. London: George, Allen & Urwin.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression analysis for the behavioural sciences*. New York: Erlbaum.

Cooper, R. (1995). Bookmaking: the last bastion of individuality. Paper presented at the Seventh Annual Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Corney, W.J. & Cummings, W.T. (1985). Gambling behavior and information processing biases. *Journal of Gambling Behavior*, 1, 111-118.

Cornish, D.B. (1978). *Gambling: a review of the literature and its implications for policy and research*. London: HSMO.

Coulombe, A., Ladouceur, R., Desharnais, R. & Jobin, J. (1992). Erroneous perceptions and arousal among regular and occasional video poker players. *Journal of Gambling Studies*, 8, 235-244.

Cowles, M., & David, C. (1987). The subject matter of psychology: volunteers. *British Journal of Social Psychology*, 26, 97-102.

Custer, R.L. (1982). An overview of compulsive gambling. In P.Carone, S.Yoles, S.Keiffer, and L.Krinsky (Eds.). *Addictive Disorders Update*. New York: Human Sciences Press.

Custer, R.L. (1984). Profile of the pathological gambler. *Journal of Clinical Psychiatry*, 45, 35-38.

Daley, K. (1987). Encouraging 'habitual' gambling on poker machines, in M.B. Walker (Ed.) *Faces of gambling*. Sydney: National Association for Gambling Studies.

Davis, J. (1995). *Blackjack for profit: 2*. Jady Davis Gaming Products, Queensland.

Davis, W.L., & Phares, E.J. (1967). Internal-external control as a determinant of information-seeking in a social influence situation. *Journal of Personality*, 35, 547-561.

Davison, G.C., & Neale, J.M. (1974). *Abnormal psychology: an experimental clinical approach*. New York: John Wiley and Sons.

DBM Consultants (1995). *Report on the findings of the Survey of Community Gambling Patterns*, Volume 1-3, Victorian Casino and Gaming Authority.

Deaux, K. & Emswiller, T. (1974). Explanations of successful performance on sex-linked tasks. *Journal of Personality and Social Psychology*, 29, 80-83.

Deaux, K., White, L., & Farris, E. (1975). Skill versus luck: field and laboratory studies of male and female preferences. *Journal of Personality and Social Psychology*, 32, 629-636.

Deldin, P.J., & Levin, I.P. (1986). The effect of mood induction in a risky decision-making task. *Bulletin of the Psychonomic Society*, 24, 4-6.

Delfabbro, P.H., & Winefield, A.H. (1996). Community gambling patterns: findings from the 1996 statewide study of the prevalence of gambling-related problems in South Australia. Paper presented at the Seventh Annual Conference of the National Association for Gambling Studies, Adelaide, South Australia.

Delfabbro, P.H., & Winefield, A.H. (1997). Gender differences in preferences for gambling activities (paper submitted for publication)

Dell, L.J., Ruzicka, M.F. & Palisi, A.T. (1981). Personality and other factors associated with the gambling addiction. *International Journal of the Addictions*, 16, 149-156.

Department of Treasury and Finance (1995*). Inquiry into the impact of gaming machines in hotels and clubs in South Australia*, South Australian Government, South Australia.

Devereax, E.C. (1968). Gambling. In D.L. Sills (Ed.). *International encyclopedia of the social sciences*, 6. USA: MacMillan/ Free Press.

Derenvensky, J.L., Gupta, R., & Della Cioppa, G. (1996). A developmental perspective of gambling behavior in children and adolescents. *Journal of Gambling Studies*, 12, 49-66.

Devinney, R.B. (1979). Gamblers: a personality study. *Dissertation Abstracts International*, 40, 429-430.

Dickerson, M.G. (1977). The role of the betting shop environment in the training of compulsive gamblers. *British Association of Behavioural Psychotherapy Bulletin*, 5, 3-8.

Dickerson, M.G. (1979). FI schedules and persistence at gambling in the UK betting office. *Journal of Applied Behaviour Analysis*, 12, 315-323.

Dickerson, M.G. (1984). *Compulsive gamblers*. London: Longman.

Dickerson, M.G. (1987). The future of gambling research: learning from the lessons of alcoholism. *Journal of Gambling Behavior*, 3, 248-256.

Dickerson, M.G. (1989). Gambling: a dependence without a drug. *International Review of Psychiatry,* 1, 157-172.

Dickerson, M.G. (1993). Internal and external determinants of persistent gambling: problems in generalising from one form of gambling to another. *Journal of Gambling Studies*, 9, 225-245.

Dickerson, M.G. (1995). 'Problem gambling: future directions in research, treatment, prevention and policy initiatives'. In J. O'Conner (Ed.) *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Dickerson, M.G. (1996). 'Problem gambling in Australia'. Paper presented at the National Conference on Gambling, St.Edmund's Private Hospital and IPS Employee Assistance, Sydney.

Dickerson, M.G. (1997). 'Gaming machine players: the role of life stressors, coping style, social support and personality in personal self regulation of gambling behaviour'. Paper presented at the Eighth Annual Conference of the National Association for Gambling Studies, Melbourne, Victoria.

Dickerson, M.G. & Adcock, S. (1987). Mood, arousal and cognitions in persistent gambling: preliminary investigation of a theoretical model. *Journal of Gambling Behavior*, 3, 3-15.

Dickerson, M.G. & Hinchy, J. (1988). The prevalence of excessive and pathological gambling in Australia. *Journal of Gambling Behavior*, 4, 135-151.

Dickerson, M.G., Fabre, J., & Bayliss, D. (1986). A comparison of TAB customers and poker machine players, in McMillen (Ed.) *Gambling in the '80s*. Brisbane: National Association for Gambling Studies.

Dickerson, M.G., Hinchy, J., & Fabre, J. (1987). Chasing, arousal and sensation seeking in off-course gamblers. *British Journal of Addiction*, 82, 673-680.

Dickerson, M.G., Hinchy, J., Schaefer, M., Whitworth, N. & Fabre, J. (1988). The use of a hand-held microcomputer in the collection of physiological, subjective and behavioral data in ecologically valid gambling settings. *Journal of Gambling Behavior*, 4, 92-98.

Dickerson, M.G, Walker, M.B., Legg England, S. & Hinchy, J. (1990). Demographic, personality, cognitive and behavioral correlates of off-course betting involvement. *Journal of Gambling Studies*, 6, 165-182.

Dickerson, M.G., & Hinchy, J., England, S.L., Fabre, J., & Cunningham, R. (1992). On the determinants of persistent gambling behaviour. I. High-frequency poker machine players. *British Journal of Psychology*, 83, 237-248.

Dickerson, M.G., Cunningham, R., Legg England, S. & Hinchy, J. (1991). On the determinants of persistent gambling III Personality, prior mood, and poker machine play. *International Journal of the Addictions*, 26, 531-548.

Dickerson, M.G., Baron, E., & O'Conner, J. (1994). *Measuring the extent and degree of gambling related problems in Western Australia*. Report to the Department of Racing and Gaming, Western Australia.

Dickerson, M.G., Boreham, P., & Harley, W. (1995). *The extent, nature and predictors of problems associated with machine gambling in Queensland- a survey-based analysis and assessment*. Report to the Department of Family and Community Services, Queensland Government.

Dickerson, M.G., Boreham, P., Harley, B., Maddern, R., & Baron, E. (1995). *Evaluation of the Break Even resource centres for problem gamblers and their families: a report of the second year of the study into the social and economic impact of the introduction of gaming machines to Queensland Clubs and Hotels*, Department of Family Youth and Community Care, Queensland Government.

Dickerson, M.G., Walker, M., & Baron, E. (1994). *Measuring the extent and degree of gambling related problems in Tasmania*. Report to Treasury, Tasmanian Government.

Dickerson, M.G., Allcock, C., Blaszczynski, A., Nicholls, B., Williams, J., & Maddern, R. (1996). *Study 2: An examination of the socio-economic effects of gambling on individuals, families and the community, including research into the costs of problem gambling in New South Wales*, Report to the Casino Community Benefit Fund Trustees, NSW Government.

Dickerson, M.G., Baron, E., Hong, S.M., Cottrell, D. (1996). Estimating the extent and degree of gambling related problems in the Australian population: a national survey. *Journal of Gambling Studies*, 12, 161-178.

Dickerson, M.G., McMillen, J., Hallebone, E., Volberg, R., & Wooley, R. (1997). *Definition and incidence of problem gambling, including the socio-economic distribution of gamblers*. Report prepared for the Victorian Casino and Gaming Authority. Melbourne, Victoria.

Dielman, T.E. (1979). Gambling: a social problem? *Journal of Social Issues*, 35, 36-42.

Downes, D.M., Davies, B.P., David, M.E., & Stone, P. (1976). *Gambling, work and leisure: a study across three areas*. London: Routledge and Kegan Paul.

Dumont, M., & Ladouceur, R. (1990). Evaluation of motivation among video-poker players. *Psychological Reports*, 66, 95-98.

Doyle, J.A. (1985). *Sex and gender: the human experience*. Dubuque, IA: Win. C. Brown.

Dykstra, S.P. & Dollinger, S.J. (1990). Model competence, depression, and the illusion of control. *Bulletin of the Psychonomic Society*, 28, 235-238.

Eadington, W.R. (1987). Economic perceptions of gambling behavior. *Journal of Gambling Behavior*, 3, 264-273.

Edwards, W. (1953). Probability preferences in gambling. *American Journal of Psychology*, 66, 349-364.

Ericsson, K.A., & Simon, H.A. (1980). Verbal reports as data, *Psychological Review*. 87, 215-250.

Erikson, E. (1963). *Childhood and Society (2nd ed.)*. New York: Norton.

Eysenck, H.J. (1967). *The biological basis of personality*. Springfield, IL: Charles C. Thomas.

Fabian, T. (1995). Pathological gambling: a comparison of gambling at German-style slot machines and 'classical' gambling. *Journal of Gambling Studies*, 11, 249-263.

Falk, J.L. (1971). The nature and determinants of adjunctive behavior. *Physiological Behavior*, 6, 577-588.

Feather, N.T. (1969). Attribution of responsibility and valence of success and failure in relation to initial confidence and task performance. *Journal of Personality and Social Psychology*, 13, 129-144.

Ferster, C.B., & Skinner, B.F. (1957). *Schedules of reinforcement*, New York: Appleton-century Crofts.

Fisher, S. (1991). Government response to juvenile fruit machine gambling in the U.K.: where do we go from here? *Journal of Gambling Studies*, 7, 217-247.

Fisher, S. (1993). Gambling and pathological gambling in adolescents. *Journal of Gambling Studies*, 9, 277-286.

Fisher, S. (1995). Adolescent slot machine dependency and delinquency: questions on a question of methodology, *Journal of Gambling Studies*, 11, 303-310.

Fisher, S. & Griffiths, M. (1995). Current trends in slot machine gambling: research and policy issues. *Journal of Gambling Studies*, 11, 239-247.

Frank, M.L. & Smith, C. (1989). Illusion of control and gambling in children. *Journal of Gambling Behavior*, 5, 127-137.

Freud, S. (1928). Dostoyevsky and parricide. *The standard edition of the complete psychological works of Sigmund Freud*, 21, London: Hogarth Press.

Frey, J.H. (1984). Gambling: a sociological review. *Annals of the American Academy of Political and Social Sciences*, 474, 107-121..

Gaboury, A., & Ladouceur, R. (1988). Irrational thinking and gambling. In Eadington, W.R. (Ed.) *Gambling research: proceedings of the seventh international conference on gambling and risk taking*, Reno: University of Nevada.

Garling, T., Romanus, J. & Selart, M. (1994). Betting at the race track: does risk seeking increase when losses accumulate? *Perceptual and Motor Skills*, 78, 1248-1250.

Gavanski, I. & Wells, G.L. (1989). Counterfactual processing of normal and exceptional events. *Journal of Experimental Social Psychology*, 25, 314-325.

Gilovich, T. (1983). Biased evaluation and persistence in gambling. *Journal of Personality and Social Psychology*, 44, 1110-1126.

Gilovich, T. & Husted Medvec, V. (1994). The temporal experience of regret. *Journal of Personality and Social Psychology*, 67, 357-365.

Gilovich, T. & Douglas, C. (1986). Biased evaluations of randomly determined gambling outcomes. *Journal of Experimental Social Psychology*, 22, 228-241.

Glass, C.D. (1972). Differences in internal-external locus of control and tolerance-intolerance for ambiguity among pathological, social and non-gambling groups. *Dissertation Abstracts*, 43, 524.

Goffman, E. (1967). *Interaction ritual*, New York: Anchor.

Goldstein, L., Manowitz, P., Nora, N., Swartzburg, M. & Carlton, P.L. (1985). Differential EEG activation and pathological gambling. *Biological Psychiatry*, 20, 1232-1234.

Golin, S., Terrell, F. & Johnson, B. (1977). Depression and the illusion of control. *Journal of Abnormal Psychology*, 86, 440-442.

Goodnow, J.J. (1955). Response sequences in a pair of two-choice probability situations. *American Journal of Psychology*, 68, 624-630.

Gordon, M.E., Slade, L.A. & Schmitt, N. (1986). The 'science of the sophomore' revisited: from conjecture to empiricism. *Journal of Management Review*, 11, 191-207.

Gray, J. (1981). A critique of Eysenck's personality theory. In H.J. Eysenck (Ed.). *A model for personality*. New York: Springer.

Greenson, R.R. (1947). On gambling. *American Imago*, 4, 61-77.

Gregory, R. (1966). *Eye and brain*. London: Weidenfeld and Nicolson.

Grichting, W.L. (1986). The impact of religion on gambling in Australia. *Australian Journal of Psychology*, 38, 45-58.

Griffiths, M.D. (1989). Gambling in children and adolescents. *Journal of Gambling Behavior*, 5, 66-83.

Griffiths, M.D. (1990a). Psychobiology of the near-miss in fruit-machine gambling. *Journal of Psychology*, 125, 347-357.

Griffiths, M.D. (1990b). The cognitive psychology of gambling. *Journal of Gambling Studies*, 6, 31-42.

Griffiths, M.D. (1991). Fruit machine addiction: two brief case studies. *British Journal of Addiction*, 86, 465.

Griffiths, M.D. (1993a). Tolerance in gambling: an objective measure using the psychophysiological analysis of male fruit machine gamblers. *Addictive Behaviors*, 18, 365-372.

Griffiths, M.D. (1993b). Fruit machine addiction in adolescence: a case study. *Journal of Gambling Studies*, 9, 387-399.

Griffiths, M.D. (1993c). Factors in problem adolescent fruit machine gambling: results of a small postal survey. *Journal of Gambling Studies*, 9, 31-46.

Griffiths, M.D. (1993d). Fruit machine gambling: the importance of structural characteristics. *Journal of Gambling Studies*, 9, 101-120.

Griffiths, M.D. (1993e). Pathological gambling: possible treatment using an audio playback technique. *Journal of Gambling Studies*, 9, 133-152.

Griffiths, M.D. (1994). The role of cognitive bias and skill in fruit machine gambling. *British Journal of Psychology*, 85, 351-369.

Griffiths, M.D. (1995a). *Adolescent gambling*. Routledge, London.

Griffiths, M.D. (1995b). Arousal and depression in gambling. Paper presented at the First European Conference on Gaming and Policy Issues, Cambridge UK.

Griffiths, M.D. (1995c). Towards a risk factor model of fruit machine addiction: a brief note. *Journal of Gambling Studies*, 11, 343-346.

Haw, J. (1997). The effect of machine characteristics on poker machine play. Paper presented at the Eighth Annual Conference of the National Association for Gambling Studies, Melbourne, Victoria.

Hebb, D.O. (1955). Drives in the c.n.s. (conceptual nervous system). *Psychological Review*, 62, 243-254.

Henshel, R.L. (1980). The purposes of laboratory experimentation and the virtues of deliberate artificiality. *Journal of Experimental Social Psychology*, 16, 466-478.

Henslin, J.M. (1967). Craps and magic. *American Journal of Sociology*, 73, 316-330.

Hess, H.F. & Diller, J.V. (1969). Motivation for gambling as revealed in the marketing methods of the legitimate gambling industry. *Psychological Reports*, 25, 19-27.

Holden, K.B., & Rotter, J.B. (1962). Supplementary report: a nonverbal measure of extinction in skill and chance situations. *Journal of Experimental Psychology*, 63, 519-520.

Holtgraves, T. & Skeel, J. (1992). Cognitive biases in playing the lottery: estimating the odds and choosing the numbers. *Journal of Applied Social Psychology*, 22, 12, 934-952.

Hong, Y., & Chiu, C. (1988). Sex, locus of control, and illusion of control in Hong Kong as correlates of gambling involvement. *Journal of Social Psychology*, 128, 667-673.

Hraba, J. & Lee, G. (1995). Gender, gambling and problem gambling. Paper presented at the First European Conference on Gaming and Policy Issues, Cambridge, U.K.

Hudgens, G.A. & Torsani Fatkin, L. (1984). Sex differences in risk taking: repeated sessions on a computer simulated task. *Journal of Psychology*, 119, 197-206.

Hurlburt, R.T., Knapp, T.J. & Knowles, S.H. (1980). Simulated slot-machine play with concurrent variable ratio and random ratio schedules of reinforcement. *Psychological Reports*, 47, 635-639.

Huxley, J. (1993). Fruit machine use in adolescents and adult women. Unpublished Ph.D. thesis, University of Birmingham.

Huxley, J. & Carroll, D. (1992). A survey of fruit machine gambling in adolescents. *Journal of Gambling Studies*, 8, 167-179.

Ibanez, A.G., Mercade, P.V., Sanroma, N.A. & Cordero, C.P. (1992). Clinical and behavioral evaluation of pathological gambling in Barcelona, Spain. *Journal of Gambling Studies*, 8, 299-310.

Jablonski, B. (1985). Locus de controle e o comportamento de jogar. *Arquivos Brasileiros de Psicologia*, 37, 19-27.

Jaccard, J., Turrisi, R., & Wan, C.K. (1990). *Interaction effects in multiple regression*. Newbury, California: Sage Publications.

Jacobs, D.F. (1986). A general theory of addictions: a new theoretical model. *Journal of Gambling Behavior*, 2, 15-31.

Jacobs, D.F. (1988). Evidence for a common dissociative-like reaction among addicts. *Journal of Gambling Behavior*, 4, 27-37.

Jacoby, O. (1950). The forms of gambling. *Annals of the American Academy of Political and Social Sciences*, 39-45.

James, W.H., & Rotter, J.B. (1958). Partial and 100% reinforcement under chance and skill conditions. *Journal of Experimental Psychology*, 55, 397-403.

Jarvik, M.E. (1951). Probability learning and a negative recency effect in the serial anticipation of alternative symbols. *Journal of Experimental Psychology*, 41, 291-297.

Jellinek, E.M. (1952). The phases of alcohol addiction. *Quarterly Journal of Studies of Alcohol*, 13, 673-1188.

Johnson, E.E. & Nora, R.M. & Bustos, N. (1992). The Rotter I-E Scale as a predictor of relapse in a population of compulsive gamblers. *Psychological Reports*, 70, 691-696.

Johnson, J.T. (1986). The knowledge of what might have been: affective and attributional consequences of near outcomes. *Personality and Social Psychology Bulletin*, 12, 51-62.

Johnson, J.E. & Bruce, A.C. (1993). Gluck's second law: an empirical investigation of horse-race betting in early and late matches. *Psychological Reports*, 72, 1251-1258.

Kahle, L.R. (1980). Stimulus condition self-selection by males in the interaction of locus of control and skill-chance situations. *Journal of Personality and Social Psychology*, 38, 50-56.

Kahneman, D. & Tversky, A. (1972). Subjective probability: a judgement of representativeness. *Cognitive Psychology*, 3, 430-454.

Kahneman, D. & Tversky, A. (1982). The psychology of preferences. *Scientific American*, January, 136-142.

Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgement under uncertainty: heuristics and biases*. London: Cambridge University Press.

Kahneman, D. & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, 39, 341-350.

Kahneman, D. & Miller, D.T. (1986). Norm theory: comparing reality to its alternatives. *Psychological Review*, 93, 136-153.

Kallick, M., Suits, D., Dielman, T., & Hybels (1979). *A survey of American gambling attitudes and behavior*. Ann Arbor, MI: Institute for Social Research, University of Michigan.

Kallick-kaufman, M. (1979). The micro and macro dimensions of gambling in the United States. *Journal of Social Issues*, 35, 7-27.

Kaplan, H.R. (1984). The social and economic impact of state lotteries. *Annals of the American Academy of Political and Social Sciences*, 474, 91-106.

Karabenik, S.A. & Addy, M. (1979). Locus of control and sex differences in skill and chance risk-taking conditions. *Journal of General Psychology*, 100, 215-228.

Kassinove, J.I. (1996). Development of the gambling attitude scales: preliminary findings. Paper presented at the Annual Meeting of the American Psychological Association, Toronto, Canada.

Kelly, G.A. (1955). *The psychology of personal constructs*. New York: Norton.

Keren, G., & Wagenaar, W.A. (1985). On the psychology of playing blackjack; normative and descriptive considerations with implications for decision theory. *Journal of Experimental Psychology*, 114, 133-158.

Keren, G., & Wagenaar, W.A. (1988). Chance and skill in gambling: a search for distinctive features. *Social Behaviour*, 3, 199-217.

Knetsch, J.L. & Sinden, J.A. (1984). Willingness to pay and compensation demanded: experimental evidence of an unexpected disparity in measures of value. *Quarterly Journal of Economics*, August, 507-521.

Koller, K.M. (1972). Treatment of poker machine addicts by aversion therapy. *Medical Journal of Australia*, 1, 742-745.

Kroeber, H. (1992). Roulette gamblers and gamblers at electronic game machines: where are the differences? *Journal of Gambling Studies*, 8, 79-92.

Kuhl, J. (1981). Motivation and functional helplessness. The moderating effect of state versus action orientation. *Journal of Personality and Social Psychology*, 40, 155-170.

Kuhlman, D.M. (1976). Individual differences in casino gambling. In Eadington, W.R. (Ed.) *Gambling and Society*, Springfield, Illinios: Thomas.

Kuiper, N.A. (1978). Depression and causal attributions for success and failure. *Journal of Personality and Social Psychology*, 36, 236-246.

Kuley, N.B., & Jacobs, D.F. (1988). The relationship between dissociative-like experiences and sensation-seeking among social and problem gamblers. *Journal of Gambling Behavior*, 4, 197-207.

Kusyszyn, I. & Rubenstein, L. (1985). Locus of control and racetrack betting behaviors: a preliminary investigation. *Journal of Gambling Behavior*, 1, 106-110.

Ladouceur, R. (1996). The prevalence of pathological gambling in Canada. *Journal of Gambling Studies*, 12, 129-142.

Ladouceur, R., & Mayrand, M. (1984). Evaluation of the 'illusion of control': type of feedback, outcome sequence, and number of trials amongst regular and occasional gamblers. *Journal of Psychology*, 117, 37-46.

Ladouceur, R., & Mayrand, M. (1986). Characteristiques psychologiques de la prise de risque monetaire des joueurs et des non-joueurs a la roulette. *International Journal of Psychology*, 21, 433-443.

Ladouceur, R., Mayrand, M., Dussault, R., Letarte, A., & Tremblay, J. (1984). Illusion of control: effects of participation and involvement, *Journal of Psychology*, 117, 47-52.

Ladouceur, R., Tourigny, & Mayrand, M. (1986). Familiarity, group exposure, and risk-taking behavior in gambling. *Journal of Psychology*, 120, 45-49.

Ladouceur, R. & Mayrand, M. (1987). Depressive behaviors and gambling. *Psychological Reports*, 60, 1019-1022.

Ladouceur, R. & Gaboury, A. (1988). Effects of limited and unlimited stakes on gambling behavior. *Journal of Gambling Behavior*, 4, 119-126.

Ladouceur, R., Gaboury, A., Dumont, D, & Rochette, P. (1988). Gambling :relationship between the frequency of wins and irrational thinking. *Journal of Psychology*, 122, 409-414.

Ladouceur, R., Gaboury, A., Bujold, A., Lachance, N. & Tremblay, S. (1991). Ecological validity of laboratory studies of videopoker gaming. *Journal of Gambling Studies*, 7, 109-116.

Ladouceur, R., Dube, D. & Bujold, A. (1994). gambling among primary school students. *Journal of Gambling Studies*, 10, 363-370.

Ladouceur, R., Arsenault, C., Dube, D., Freeston, M.H., & Jacques, C. (1997). Psychological characteristics of volunteers in studies on gambling. *Journal of Gambling Studies*, 13, 69-84.

Langer, E.J. (1975). The Illusion of Control. *Journal of Personality and Social Psychology*, 32, 311-328.

Langer, E.J., & Roth, J. (1983). Heads you win, tails it's chance: the illusion of control as a function of the sequence of outcomes in a purely chance task. *Journal of Personality and Social Psychology*, 32, 951-955.

Lea, S.E.G., Tarpy, R.M., & Webley, P. (1987). *The individual in the economy*. Cambridge: Cambridge University Press.

Leary, K. & Dickerson M. (1985). Levels of arousal in high and low frequency gamblers. *Behaviour Research and Therapy*, 23, 635-640.

Lefcourt, H.M. (1966). Internal versus external control of reinforcement: a review. *Psychological Bulletin*, 65, 206-220.

Leopard, A. (1978). Risk preference in consecutive gambling. *Journal of Experimental Psychology: Perception and Performance*, 4, 521-528.

Lesieur, H.R. (1979). The compulsive gambler's spiral of options and involvement. *Psychiatry*, 42, 79-87.

Lesieur, H.R. (1984). *The chase: career of the compulsive gambler* (2nd Ed.)., Schenkman Books Inc., Rochester, Vermont.

Lesieur, H.R. (1992). Compulsive gambling. *Society*, May/June, 43-50.

Lesieur, H. R. (1994). Epidemiological surveys of pathological gambling: critique and suggestions for modification. *Journal of Gambling Studies*, 10, 385-398.

Lesieur, H.R. (1996). Measuring the costs of pathological gambling. Paper presented at the Seventh Annual Conference of the National Association for Gambling Studies, Adelaide, South Australia.

Lesieur, H.R., & Blume, S. (1987). The South Oaks Gambling Screen (the SOGS): a new instrument for the identification of pathological gamblers. *American Journal of Psychiatry*, 144, 1184-1188.

Lesieur, H.R. & Custer, R.L. (1984). Pathological gambling: roots, phases, and treatment. *Annals of the American Academy of Political and Social Sciences*, 474, 146-156.

Lesieur, H.R. & Rosenthal, M.D. (1991). Pathological gambling: a review of the literature. *Journal of Gambling Studies*, 7, 5-39.

Lesieur, H.R., & Klein, R. (1987). Pathological gambling amongst high school students. *Addictive Behaviors*, 12, 129-135.

Lester, D. (1980). Choice of gambling activity and belief in locus of control. *Psychological Reports*, 47, 22.

Letarte, A., Ladouceur , R, & Mayrand, M. (1986). Primary and secondary illusory control and risk-taking in gambling (roulette). *Psychological Reports*, 58, 299-302.

Levin, I.P., Snyder, M.A. & Chapman, D.P. (1987). The interaction of experiential and situational factors and gender in a simulated risky decision-making task. *Journal of Psychology*, 122, 173-181.

Lewis, D. J., & Duncan, C.P. (1958). Expectation and resistance to extinction of a level-pulling response as a function of percentage of reinforcement and number of acquisition trials. *Journal of Experimental Psychology*, 35, 121-128.

Levitz, L.S. (1971). The experimental induction of compulsive gambling behaviours. *Dissertation Abstracts International*, 32B, 1216-1217.

Liker, J.K. & Ceci, S.J. (1987). IQ and reasoning complexity: the role of experience. *Journal of Experimental Psychology: General*, 116, 304-306.

Lindgren, H.E., Youngs, G.A., McDonald, T.D., Klenow, D.J. & Schriner, E.C. (1987). The impact of gender on gambling attitudes and behavior. *Journal of Gambling Behavior*, 3, 155-167.

Loftus, G.A., & Loftus, E.F. (1983). *Mind at play: the psychology of video games*. New York: Basic Books.

McMillen, J. (1995). 'Social impacts of urban casinos: the Australian experience'. In J. O'Conner (Ed.) *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

McMillen, J. (1996). 'Risky ventures: casino regulation in a changing market'. In J.McMillen, M.Walker, & S. Sturevska (Eds.) *Lady Luck in Australia*, National Association for Gambling Studies, Sydney.

McCormick, R.A. (1987). Pathological gambling: a parsimonious need state model. *Journal of Gambling Behavior*, 3, 257-263.

McCormick, R.A. (1994). The importance of coping skill enhancement in the treatment of the pathological gambler. *Journal of Gambling Studies*, 10, 77-86.

McCormick, R.A., Russo, A.M., Ramirez, L.F. & Taber, J.I. (1984). Affective disorders among pathological gamblers seeking treatment. *American Journal of Psychiatry*, 141, 215-218.

McCormick, R.A., Taber, J., Kruedelbach, N., & Russo, A. (1987). Personality profiles of gamblers: The Californian Personality Inventory, *Journal of Clinical Psychology*. 43, 521-527.

McGregor, M. (1996). 'Smart-Play': an industry safety net. Paper presented at the Seventh Annual Conference of the National Association for Gambling Studies, Adelaide, South Australia.

McGurrin, M.C. (1992). *Pathological gambling: conceptual, diagnostic, and treatment issues.* Sarasota, Florida: Professional Resource Press.

Maddern, R., & Dickerson, M. (1997). Psychological modelling of underage gambling behaviour. Paper presented at the Eighth Annual Conference of the National Association for Gambling Studies, Melbourne, Victoria.

Mark, M.M., & Lesieur, H.R. (1992). A feminist critique of problem gambling research. *British Journal of Addiction*, 87, 549-565.

Markman, K.D., Gavanski, I., Sherman, S.J. & McMullen, M.N. (1993). The mental simulation of better and worse possible worlds. *Journal of Experimental Social Psychology*, 29, 87-109.

Markman, K.D., Gavanski, I., Sherman, S.J. & McMullen, M.N. (1995). The impact of perceived control on the imagination of better and worse possible worlds. *Personality and Social Psychology Bulletin*, 21, 588-595.

Marlatt, G.A. (1979). Alcohol use and problem drinking: cognitive-behavioral analysis. In P.C. Kendall and S.D. Hollon (Eds.) *Cognitive behavioural interventions, theory, research and procedures*. London: Academic Press.

Marlatt, G.A., Baer, J.S., Donovan, D.M., and Kivlahan, D.R. (1988). Addictive behaviors: etiology and treatment. *Annual Review of Psychology*, 39, 223-252.

Martinez, J.C. (1995). Risk taking on gender-typed tasks following an assignment based upon sex. *Journal of Social Psychology*, 135, 573-579.

Matute, H. (1995). Human reactions to uncontrollable outcomes: further evidence for superstitions rather than helplessness. *The Quarterly Journal of Experimental Psychology*, 48B, 142-157.

Maze, J.R. (1987). Lady luck is gambler's mother. In Walker, M.B. (Ed.) *Faces of gambling*. Sydney: National Association for Gambling Studies.

Metzger, M. (1985). Biases in betting: an application of laboratory findings. *Psychological Reports*, 56, 883-888.

Miller, W.R., & Seligman, M.E.P. (1973). Depression and the perception of reinforcement. *Journal of Abnormal Psychology*, 82, 62-73.

Miller, D.T., & Ross, M. (1977). Self-serving biases in the attribution of causality: fact or fiction. *Psychological Bulletin*, 82, 213-225.

Miller, D.T., Turnbill, W. & McFarland, C. (1989). When a coincidence is suspicious: the role of mental simulation. *Journal of Personality and Social Psychology*, 57, 581-589.

Mobilia, P. (1992). A little bit more evidence of lottery regressivity: the Kansas State Lottery. *Journal of Gambling Studies*, 8, 361-369.

Mok, W.P. & Hraba, J. (1991). Age and gambling behavior: a declining and shifting pattern of participation. *Journal of Gambling Studies*, 7, 313-335.

Moran, E. (1970a). Gambling as a form of dependence. *British Journal of Addiction*, 64, 419-428.

Moran, E. (1970b). Varieties of pathological gambling. *British Journal of Psychiatry*, 116, 593-7.

Moran. (1979). An assessment of the report of the Royal Commission on Gambling 1976-1978. *British Journal of Addiction*, 74, 3-9.

Morgan Research (1997). *Older people and gambling*. Report prepared for the Victorian Casino and Gaming Authority, Melbourne, Victoria.

Murgatroyd, S., Rushton, C., Apter, M., & Colette, R. (1978). The development of the Telic Dominance Scale, *Journal of Personality Assessment*, 42, 519-528.

Murray, J.B. (1993). Review of research on pathological gambling. *Psychological Reports*, 72, 791-810.

Naranjo, C.A., Sellers, E.M., & Lawrin, M.O. (1986). Modulation of ethanol intake by serotonin uptake inhibitors. *Journal of Clinical Psychiatry*, 47, 16-22.

Nisbett, R.E., & Wilson, T.D. (1977). Telling more than we know: verbal reports on mental processes. *Psychological Review*, 84, 231-259.

O'Conner, J., Dickerson, M., & Blaszczynski, A. (1995). Chasing and its relationship to impaired control over gambling. In J. O'Conner (Ed.) *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Oldman, D. (1974). Chance and skill: a study of roulette. *Sociology*, 8, 407-426.

Orford, J.R. (1984). *Excessive appetites: a psychological explanation of addictive behaviors*. London: Wiley.

Ohtsuka, K, Bruton, E., Borg, V., DeLuca, L., & Imms, T. (1995). Gender differences in pathological gamblers using gaming machines. In J. O'Conner (Ed.) *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Oxford English Dictionary (1992). Oxford: Oxford University Press.

Paulson, R.A. (1994). Communication: a comment on the misperception of streaks. *Journal of Gambling Studies*, 10, 199-205.

Perkins, E.B. (1950). Cited in Cornish, D.B. (1978). *Gambling: a review of the literature and its implications for policy and research*. London: HSMO

Peterson, C. (1988). Explanatory style as a risk factor for illness. *Cognitive Therapy and Research*, 12, 117-130.

Peterson, C., & Seligman, M.E.P. (1982). Explanatory style and illness. *Journal of Personality*, 55, 237-265.

Peterson, C., Semmel, A., von Bayer, C., Abramson, L.Y., Metalsky, G.I., & Seligman, M.E.P. (1982). The attributional style questionnaire. *Cognitive Therapy and Research*, 6, 287-300.

Phares, E.J. (1957). Expectancy changes in skill and chance situations, *Journal of Experimental Psychology*. 54, 339-342.

Pierce, M., Sagris, A., & Loughton (1997). Women gamblers/men gamblers-mapping the differences. Paper presented at the Eighth annual conferences of the National Association for Gambling Studies, Melbourne, Victoria.

Rachlin, H. (1990). Why do people gamble and keep gambling despite heavy losses?. *Psychological Science*, 1, 294-297.

Rappoport, A., & Budescu, D.V. (1992). Generation of random series in a two-person strictly competitive games. *Journal of Experimental Psychology*: *General*, 121, 352-363.

Reid, R.L. (1986). The psychology of the near miss. *Journal of Gambling Behavior*, 2, 32-39.

Remmers, P. (1997). Responsible gaming: necessity or deadweight. Paper presented at the Eighth Annual Conference of the National Association for Gambling Studies, Melbourne, Victoria.

Rizley, R. (1978). Depression and distortion in the attribution of causality. *Journal of Abnormal Psychology*, 87, 37-48.

Roese, N.J. (1994). The functional basis of counterfactual thinking. *Journal of Personality and Social Psychology*, 66, 805-818.

Roscreance, J. (1985). Compulsive gambling and the medicalization of deviance. *Social Problems*, 32, 275-283.

Roscreance, J. (1986). 'The next best thing': a study of problem gambling. *International Journal of the Addictions*, 20, 1727-1739.

Rosenthal, R.J. (1986). The pathological gambler's system for self-deception. *Journal of Gambling Behavior*, 2, 108-120.

Rothbaum, F., Weisz, J.R., & Snyder, S.S. (1982). Changing the world and changing the self: a two-process model of perceived control. *Journal of Personality and Social Psychology*, 42, 5-37.

Rotter, J.B. (1954). *Social learning theory and clinical psychology*. New York: Prentice-Hall.

Rotter, J.B. (1966). Generalised expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80, (whole No. 609).

Rotter, J.B. & Mulry, R.C. (1965). Internal versus external control of reinforcement and decision-time. *Journal of Personality and Social Psychology*, 2, 598-604.

Roy, A., De Jong, J., & Linnoila, M. (1989). Extraversion in pathological gamblers. *Archives of General Psychiatry*, 46, 679-681.

Rubin, J.Z., & Brockner, J. (1975). Factors affecting entrapment in waiting situations: the Rosencrantz and Guildenstern effect. *Journal of Personality and Social Psychology*, 31, 1054-1063.

Rule, B.G., & Fischer, D.G. (1970). Impulsivity, subjective probability, cardiac response and risk taking: correlates and factors. *Personality*, 1, 251-260.

Rule, B.G., Nutler, R.W., & Fischer, D.G. (1971). The effect of arousal on risk-taking. *Personality*, 2, 239-247.

Saunders, D.M. (1981). The late betting phenomenon in relation to type of bet and type of race. *Behavioural Psychotherapy*, 9, 330-337.

Saunders, D.M., & Wookey, P.E. (1980). Behavioural analysis of gambling. *Behavioural Psychotherapy*, 8, 1-6.

Schneider, J.M. (1968). Skill versus chance activity preference and locus of control. *Journal of Consulting and Clinical Psychology*, 32, 333-337.

Schneider, J.M. (1972). Relationship between locus of control and activity preferences. Effects of masculinity, activity, and skill. *Journal of Consulting and Clinical Psychology*, 38, 225-230.

Seager, C.P. (1970). Treatment of compulsive gamblers by electrical aversion. *British Journal of Psychiatry*, 117, 545-553.

Shaffer, H.J., Scanlan, K.M. & Cummings, T.N. (1994). Pathological gambling among adolescents: Massachusetts Gambling Screen (MAGS). *Journal of Gambling Studies*, 10, 339-362.

Seligman, M.E.P., Abramson, L.Y., Semmel, A., & Von Baeyer, C. (1979). Depressive attributional style. *Journal of Abnormal Psychology*, 88, 242-247.

Shapira, Z. & Venezia, I. (1992). Size and frequency of prizes as determinants of the demand for lotteries. *Organizational Behavior and Human Decision Processes*, 52, 307-318.

Sharpe, L. & Tarrier, N. (1993). Towards a cognitive-behavioural theory of problem gambling. *British Journal of Psychiatry*, 162, 407-412.

Shubik, M. (1971). The dollar auction game: a paradox in noncooperative behavior and escalation. *Journal of Conflict Resolution*, 15, 109-111.

Siegel, S. (1957). Level of aspiration and decision-making. *Psychological Review*, 64, 323-328.

Siegel, S. (1988). *Nonparametric statistics for the behavioral sciences*. New York: McGraw- Hill

Simmel, E. (1920). Psychoanalysis of the gambler. *International Journal of Psychoanalysis*, 1, 352-355.

Skinner, B.F. (1938). *The behavior of organisms*. New York: Appleton Century-Crofts.

Skinner, B.F. (1953). *Science and Human Behavior*. New York: Free Press.

Skinner, B.F. (1969). *Beyond freedom and dignity*. New York: Knopf.

Skinner, B.F. (1974). *About behaviourism*. New York: Knopf.

Smith, J.H. & Abt, V. (1984). Gambling as play. *Annals of the American Academy of Political and Social Sciences*, 474, 122-132.

Solomon, R.L., & Corbit, J.D. (1974). An opponent-process theory of motivation. *Psychological Review*, 81, 119-145.

Solonsch, M. (1991a). *The complete guide to Australian gambling*. Wrightbooks Pty. Ltd., Victoria.

Solonsch, M. (1991b). 'The Australian gambling market: an overview of today and a look to the future.' *National Association for Gambling Studies Newsletter*, 3, 2-16.

Solonsch, M. (1991c). An analysis of skill in gambling. Paper presented at the Eighth International Conference on Risk and Gambling. London.

Sommors, I. (1988). Pathological gambling: estimating prevalence and group characteristics. *International Journal of the Addictions*, 23, 477-490.

Sorrentino, R.M., Hewitt, E.C. & Raso-Knott, P. A. (1992). Risk-taking in games of chance and skill: informational and affective influences on choice behavior. *Journal of Personality and Social Psychology*, 62, 522-533.

Stein, A.H. (1971). The effects of sex-role standards for achievement and sex-role preference on three determinants of achievement motivation. *Developmental Psychology*, 4, 219-231.

Stotter, K. (1980). Why play that poker machine. *Australian Journal of Social Issues*, 15, 160-164.

Strickland, L.H. &, Grote, F.W. (1967). Temporal presentation of winning symbols and slot machine playing. *Journal of Experimental Psychology*, 74, 10-13.

Syme, D. (1996). 'An analysis of the sociological factors involved in the decline of the New Zealand racing industry'. In J. McMillen, M., Walker, & S. Sturevska (Eds.) *Lady Luck in Australia*, National Association for Gambling Studies, Sydney.

Taber, J.I., McCormick, R.A., & Ramirez, L.F. (1987). The Prevalence and impact of major life stressors among pathological gamblers. *International Journal of the Addictions*, 22, 71-79.

Tasmanian Gaming Commission (1995). *Australian gambling statistics*, Hobart.

Taylor, L., Newman, S., Mangis, C., Swiander, M., Garibaldi, C., Ismael, A., Talmore, D., Tritak, D. and Gittes, M. (1992). Gender and attribution: a reversal or bias. *Journal of Social Psychology*, 133, 575-577.

Teger, A.I. (1979). *Too much invested to quit: the psychology of the escalation of conflict*. New York: Pergamon Press.

Thompson, W.N. (1991). Machismo: manifestations of a cultural value in the Latin American Casino. *Journal of Gambling Studies*, 7, 143-164.

Toneguzzo, S. (1997). Gollywog and troll logic is to engineering logic as problem gambling is to responsible gambling. Paper presented at the Eighth Annual Conference of the National Association for Gambling Studies, Melbourne, Victoria.

Tune, G.S. (1964). Response preferences: a review of some relevant literature. *Psychological Bulletin*, 61, 286-302.

Tversky, A., & Kahneman, D. (1973). Availability: a heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 207-233.

Vatz, R.E., & Weinberg, L.S. (1986). Gambling a disease? Let's call that bluff, second opinion. *Washington Post*, April 2.

Vestre, N.D. (1984). Irrational beliefs and self-reported depressed mood. *Journal of Abnormal Psychology*, 93(2), 239-241.

Volberg, R.A. (1994). The prevalence and demographics of pathological gamblers: implications for public health. *American Journal of Public Health*, 237-241.

Volberg, R.A. & Steadman, H.J. (1992). Accurately depicting pathological gamblers: policy and treatment implications. *Journal of Gambling Studies*, 8, 401-412.

Volberg, R.A. (1997). Prevalence research and the evolution of responsible gambling. Paper presented at the Eighth Annual Conference of the National Association for Gambling Studies, Melbourne, Victoria.

Von Neumann, J. & Mogernstern, O. (1947). *Theory of games and economic behavior*. Princeton, N.J.: Princeton University Press.

Wagenaar, W.A. (1972). Generation of random sequences by human subjects: a critical review of the literature. *Psychological Bulletin*, 77, 65-72.

Wagenaar, W.A. (1988). *Paradoxes of gambling behaviour*. England: Erlbaum.

Wagenaar, W.A., & Keren, G.B. (1988). Chance and luck are not the same. *Journal of Decision-making*, 1, 65-75.

Walker, M.B. (1985). Explanations for gambling, In G.T. Caldwell, B. Haig, M.G. Dickerson, & L. Sylvan (Eds.), *Gambling in Australia*, Sydney: Croom Helm.

Walker, M.B (1988). The presence of irrational thinking amongst poker machine players. Paper presented at the Conference of the National Association for Gambling Studies, NAGS, Canberra.

Walker, M.B. (1989). Some problems with the concept of 'gambling addiction': should theories of addiction be generalised to include excessive gambling. *Journal of Gambling Behavior*, 5, 179-200.

Walker, M.B. (1992a). *The Psychology of Gambling*, Pergamon Press, Sydney.

Walker, M.B. (1992b). Irrational thinking among slot machine players. *Journal of Gambling Studies*, 8, 245-288.

Walker, M.B. (1995). Pathological gambling: the fundamental error. In J.O'Conner (Ed.). *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Walker, M.B. (1996a). Prevalence estimates for problem gambling: another lottery. Paper presented at the Seventh Annual Conference of the National Association for Gambling Studies, Adelaide, South Australia.

Walker, M.B. (1996b). Effective treatments for problem gambling: design for a controlled trial. Paper presented at the Seventh Annual Conference of the National Association for Gambling Studies, Adelaide, South Australia.

Walker, M.B., & Dickerson, M.G. (1996). The prevalence of problem and pathological gambling: a critical analysis. *Journal of Gambling Studies*, 12, 233-249.

Walker, M.B., Sturevska, S., & Turpie, D. (1995). The quality of play in Australian casinos. Paper presented at the seventh conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Wallace, M, Singer, G., Wayner, M.J. & Cook, P. (1975). Adjunctive behavior in humans during game playing. *Physiology and behavior*, 14, 651-654.

Weinstein, D., & Dietch, L. (1974). *The impact of legalised gambling*. New York: Praeger.

White, R. (1959). Motivation reconsidered: the concept of competence. *Psychological Review*, 66, 297-333.

Wildman, R.W. (1991). Book Review of The Gambler by Fyodor Dostoyevsky. *Journal of Gambling Studies*, 7, 169-175.

Winefield, A.H. (1962). *An experimental investigation into some aspects of human two-choice guessing behaviour.* Unpublished doctoral dissertation, University College London.

Winefield, A.H. (1966). Negative recency and event dependence. *Quarterly Journal of Experimental Psychology*, 18, 47-54.

Wolfgang, A.K. (1988). Gambling as a function of gender and sensation seeking. *Journal of Gambling Behavior*, 4, 71-77.

Wolfgang, A.K., Zenker, S.I. & Viscusi, T. (1984). Control motivation and the illusion of control in betting on dice. *Journal of Psychology*, 116, 67-72.

Wong, G. (1980). The obsessional aspects of compulsive gambling. Paper presented to the Society for the Study of Gambling, London.

Wooton, R. (1995). 'The State of gambling-Victoria'. In J. O'Conner (Ed.) *High Stakes in the Nineties*, Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Wortman, C.B., & Brehm, J.W. (1975). Responses to uncontrollable outcomes: an integration of reactance theory and the learned helplessness model. In L. Berkowitz (Ed.) *Advances in experimental social psychology*, 8, New York: Academic Press.

Wray, I., & Dickerson, M.G. (1981). Cessation of high frequency gambling and 'withdrawal symptoms. *British Journal of Addiction*, 76, 401-405.

Zimmerman, D.W., & Zumbo, B.D. (1990). Effect of outliers on the relative power of parametric and nonparametric statistical tests. *Perceptual and Motor Skills*, 71, 339-349.

Zuckerman, M. (1979). *Sensation seeking: beyond the optimal level of arousal.* Hillsdale, NJ: LEA Inc. Publications.

Zuckerman, M., Neary, R.S., & Brustman, B.A. (1970). Sensation-seeking scale correlates in experience (smoking, drugs, alcohol, 'hallucinations', and sex) and preference for complexity (designs). *Proceedings of the 78th annual convention of the American Psychological Association*, 5, 317-318.

Appendix A

Article 1: Based upon Chapter 10

Poker Machine Gambling: an analysis of within session characteristics

Paul Delfabbro
Anthony Winefield

Department of Psychology
University of Adelaide

Correspondence to: Paul Delfabbro, Department of Psychology, University of Adelaide, Nth. Tce., 5000.

Abstract

The aim of this study was to examine the nature of poker machine gambling in an ecologically valid setting. Eighteen regular and 21 occasional poker machine players were observed, using a methodology that allowed simultaneous recording of machine events, behaviour and cognitions. The results supported previous research by Dickerson et al. (1990, 1992) showing that slot machine gambling is a highly disciplined, or 'stereotyped' behaviour. However, contrary to the fact that poker machines are based upon random-ratio schedules, behaviour was found to be more consistent with 'fixed-ratio responding' (Ferster & Skinner, 1957), with players in both groups showing a tendency to pause after having obtained large rewards and maintained rapid response rates in the absence of reward. Further analyses of betting behaviour showed that regular players were not only less likely to alter their stakes, but also appeared more sensitive to the nature of outcomes, with stake increases typically following wins, decreases following losses. Finally, although confirming that expectancies of winning are unrelated to behaviour or outcomes, observations revealed that many players believed they could 'discriminate' the conditions under which reinforcement was most likely.

Recent research (e.g., Dickerson, 1993; Dickerson, Hinchy, Cunningham & Legg-England, 1991; Dickerson, Hinchy, Legg-England, Fabre & Cunningham, 1992) suggests that poker machine gambling may be a 'highly disciplined' or schedule-based behaviour. According to this view, persistent gambling can be explained in terms of the powerful reinforcing effects of intermittent schedules (Ferster & Skinner, 1957; Skinner, 1953), and the sensitivity of behaviour to gambling-related stimuli. Dickerson et al. (1990, 1992) have based this conclusion on studies of gamblers in 'ecologically valid' settings, where it has been found that gambling behaviour appears highly sensitive to 'machine events'. For example, a consistent finding is that response rates of poker machine players tend to vary differentially depending upon the magnitude of cash reinforcement. Small wins appear to increase the rate of response, whereas large wins appear to decrease them. These trends have been observed in all players, but most strongly in regular players, suggesting that frequent gambling leads to highly conditioned or stereotyped behaviour (Dickerson, 1989, 1993).

It is argued that these findings may have important implications for gambling research (Dickerson, 1989, 1993). The notion that behaviour can become sensitive to gambling events may help to explain why some gamblers lose control over their gambling. If reinforcement becomes associated with certain gambling events, the motivation to gamble may become increasingly dictated by factors external to the gambler. Gamblers may find it increasingly difficult to resist the temptation to gamble or cease gambling once a session has commenced (see Baron, Dickerson & Blaszczynski, 1995; Corless & Dickerson, 1989; O'Conner, Dickerson & Phillips, 1995).

The attractiveness of this theory is that in being able to explain persistent gambling in terms of learning principles, it becomes possible to understand why such a wide range of people can become entrapped in the gambling process (see Griffiths, 1995b; Mark & Lesieur, 1992; Walker, 1993 for a review of personality correlates in gambling research). Furthermore, explanations can be provided without reference to internal biological processes, personality differences, genetic predispositions or traditional addiction theories, all of which have often proved unsatisfactory in distinguishing problem gamblers from others who gamble (Dickerson, 1984, 1989, 1991, 1993).

However, as might be expected, this view has not been universally accepted by other researchers. As Walker (1993) has suggested in a recent critique, there are several questions concerning Dickerson et al.'s (1991, 1992) studies which need to be addressed before confident conclusions can be drawn concerning the validity of operant theory as an explanation for poker machine gambling. Described below, these issues are: firstly, whether Dickerson et al. have adequately demonstrated the operation of established learning principles (Ferster & Skinner, 1957; Skinner, 1953); secondly, whether the observations can be adequately explained using other theoretical perspectives; and thirdly, whether the behavioural effects observed are genuine, or merely an artefact of the methodology used.

Walker's first point is that Dickerson's results do not appear to be entirely consistent with established operant principles. Operant conditioning is based upon the assumption that the strength of behaviour should be positively related to the magnitude of reward. Yet, as noted above, Dickerson et al. have discerned a curvilinear relationship, with large wins giving rise to a decrease in responses. Secondly, although Dickerson et al.'s finding confirmed the operant prediction that players would persistent through long intervals without reward, his definition of non-reward is not entirely equivalent to the definition which has applied in traditional operant studies. In most operant experiments, non-reward means a failure to obtain reinforcement, whereas in gambling, a failure usually means a loss of a coin or credits, which is arguably a form of punishment. Thus, if gamblers are usually losing more than they are winning, the prediction would be for a decrease in response strength rather than the continuation of behaviour which Dickerson et al. have observed.

For these reasons, Walker has suggested that Dickerson et al.'s findings can be more easily explained using other theories, such as those based upon cognitive principles. For example, the tendency of players to decrease response rates following large wins, and to persist despite losing-streaks, can be explained in terms of the well-known 'gambler's fallacy' (Cohen, 1972; Jarvik, 1951; Winefield, 1966) or 'representativeness' bias (Corney & Cummings, 1985; Griffiths, 1995b; Kahneman & Tversky, 1972; Wagenaar, 1988). This occurs when players believe that short-run sequences of events should reflect the characteristics of long-run sequences. This logic implies that wins should eventually follow long losing sequences, and losses follow

large wins, so as to maintain the long-run expected return. Players in Dickerson's study may have only decreased response rates after large wins because their 'knowledge' of the machine suggested that they would have to wait a long time before the next good win. Conversely, the maintenance of response-rates during losing streaks could be due to players believing that the sequence was eventually going to end.

Although, as Walker concedes, Dickerson et al. partly addressed this issue by including an 'expectancy of winning' measure in their studies, he points out that this measure did not appear to be sufficiently sensitive to discern the presence of any underlying cognitive biases. Ratings were only obtained every five minutes or after a 'big win', so that in sessions of less than 40 minutes, insufficient 'expectancy' data would have been obtained to make this variable a useful predictor in regression analyses. Therefore, it was not surprising that this variable was found to be unrelated to any other variables in the study.

Walker's third criticism is that, because expectancy ratings (and other ratings) were taken after every big win, it is possible that this may have been partially responsible for the observed decreases in response-rates. Despite only taking 15-20 seconds to complete (see Dickerson et al., 1991, 1992), Walker, nevertheless, argues that this may have been sufficient to draw the player's attention away from the activity thereby breaking the natural flow of the game. He suggests that Dickerson et al.'s findings may need to be reconsidered with this confounding factor removed, so that the effects of large reinforcements can be more clearly interpreted.

Given these criticisms, the aim of this present study was to re-examine Dickerson et al.'s findings using a sample of occasional and regular gamblers in an ecologically valid gambling setting. In this study, a direct observation method was adopted which allowed simultaneous recording of behaviour, machine events, and subjective ratings, and which reduced the need for experimenter interference. Response rates were recorded by a small unobtrusive camera, and expectancies were spoken aloud (Griffiths, 1994; Ladouceur, Gaboury, Dumont & Rochette, 1988; Walker, 1992) every 30 seconds to obtain a more sensitive measure of player confidence.

Hypotheses

Based upon Dickerson's findings, it was predicted that response rates would be fastest in intervals containing only small wins (defined by Dickerson as wins of 1-50 credits), slower in intervals with no wins, but slowest of all in intervals containing large wins (defined as wins of more than 50 credits in Dickerson et al.'s studies). It was also predicted that these response rate variations would be more strongly observed in regular players and that variations would persist into subsequent intervals. Here, previous research was extended by examining whether the response patterns could be replicated on more technologically advanced 5c machines, rather than on the older style 20c machines used in Dickerson et al.'s studies.

A second aim of this study was to examine whether players believed they could predict when the machine was going to pay out a good win. If response rate variations were merely the result of the a belief in 'representativeness' or the gambler's fallacy (Corney & Cummings, 1985; Kahneman & Tversky, 1972), one would expect expectancy decreases following winning sequences, and expectancy increases following losing sequences.

The third aim of this study was to examine the nature of 'stake' changes, in particular the way in which players varied the amount staked on each trial in response to winning and losing sequences. It is possible that this is another aspect of gambling behaviour which may be sensitive to variations in reinforcement.

Method

Subjects

This study involved 21 occasional gamblers (8 men, 13 women) and 18 regular gamblers (8 men, 10 women) recruited from an advertisement placed in a suburban newspaper. Regular gamblers were defined as those who gambled at least weekly on poker machines, whereas occasional (or non-regular players) were those who gambled less often. This classification was used to allow comparisons with previous studies of slot machine gambling (Dickerson et al., 1991; Griffiths, 1994, 1995a; Ladouceur et al., 1991). Of those in the occasional group, 13 (62%) players were aged 18-35 years, 8 (38%) were aged 36 years or over; whereas in the regular group, 6 (33%) were aged

18-35 years and 67% were aged 36 years or older. This difference in percentages was not statistically significant, $\chi 2(1)=2.13$, n.s..

The groups did, however, differ in their level of gambling involvement. Regular gamblers spent significantly more money (in dollars) per session (M=32.5, s.d.=21.9) than occasional gamblers (M=20.0, s.d.=14.0), $t(37)=2.09$, $p < .05$, and also tended to play for longer in each session, (M=123.9 minutes, s.d.=73.1) compared with (M=66.0 minutes, s.d.=49.6), $t(36)=4.22$, $p < .01$ (note 1 missing data item). These results confirmed the validity of dividing the sample on the basis of the frequency of participation.

Apparatus

Gambling behaviour, outcomes, and verbalisations were recorded using a miniature Sony video-recorder (approximately 20cm in length) with a powerful condenser microphone placed next to the machine during play. The recorder had a wide lens allowing the entire screen and gambling buttons to be filmed at a distance of 30cm. This allowed the recorder to be placed next to the players' arms, so that no part of the players' bodies (apart from their fingers) were in the picture. This recorder could be quickly moved from one machine to the next without disruptions to the recording process.

The poker machines used in the study did not differ from those in any other gambling venue in South Australia. All 16 were electronic and manufactured by Aristocrat Leisure Industries Pty. Ltd. or Olympic Amusements Pty. Ltd.. Each machine allowed a minimum bet of 5c per spin, allowed bets on 1-5 or 1-9 lines, a maximum bet of 90 credits or 10 credits for 9 lines ($4.50), and had a maximum jackpot of $10,000. The expected return from the machines ranged from 87% to 90%.

Procedure

The study was conducted in a central gambling venue in the city of Adelaide, South Australia. Players met the experimenter at a mutually convenient time inside the venue, were provided with an information sheet describing the details of the experiment, and were asked to fill out a short questionnaire describing their gambling habits. Players were told that they would receive $20 for participating in the experiment and were

given the choice of: (a). Using this money in the experiment and receiving nothing afterwards if they lost it, (b). Using their own money during the experiment and receiving the $20 afterwards. Either way, players were told that they could keep any money they obtained in the experiment. This method was generally consistent with that of Griffiths (1994, 1995a) and Ladouceur et al. (1991) who have found that allowing players to keep their winnings is sufficient to maintain the validity of gambling experiments.

Players were told to play as naturally as possible, and could choose any machine they liked and change machines whenever they wanted. The only restriction was that they were told to play for at least fifteen minutes so that a reasonable number of trials could be recorded. Once this 15 minutes had been completed, players were asked if they wished to continue. Those who said 'yes' continued with the experiment for as long as they wished (c.f. Griffiths, 1994a, 1994b). Those who had not spent the entire $20 when they ceased playing were free to keep the remainder as a participation fee. Those who ran out of money before this time were free to play with their own money to continue the session.

Participants were told that the purpose of the task was to examine people's perceptions of poker machines and whether they could tell when the machine was more or less likely to pay out. A short rating scale (1-10) was placed just above the buttons and asked players to rate how confident they were that the machine would pay out a good-sized win (defined as 50 credits or more) during the next few trials (defined as the next 1-10 trials). Players were asked to speak aloud a number every 30 seconds, but could do so more frequently if they felt that their expectancy had changed during this interval. A rating of 1 meant that they were 'not confident at all', 5 indicated moderate confidence, whereas a rating of 10 indicated that they were extremely confident.

To reduce anxiety concerning the presence of a camera, players were allowed to look through the viewing lens to confirm that only the screen was being filmed. Once each session was underway, the experimenter was able to leave the players alone with the camera, and this reduced the need for an observer scrutinising their actions from a nearby position. In this way, it was possible to recreate the conditions of a normal gambling session, relatively free from experimenter interference.

After the session was completed, there was a brief informal debriefing session in which the players were given the opportunity to talk about their experiences during the session, whether they believed there was any method to play poker machines, and whether they felt their normal gambling behaviour had been affected by the experimental observations. In general, players said that their behaviour had not been affected by the experimental design, although 3 occasional players said they would have left the venue earlier had they been playing with their own money.

Post-Experimental Analysis

When sessions were completed, the recordings were transferred to VHS format and viewed by the experimenter. Scoring was undertaken using a small lap-top computer converted into an event-recorder. The amount bet on each trial, the amount won and the outcome of each spin were recorded by pressing keys on the keyboard, with inter-response intervals being the total time elapsed between the entry of successive bet amounts. This method allowed the determination of accurate inter-response intervals recorded to 1/10th of a second.

Results

(a). *Session Characteristics*

Details of the session characteristics for the 39 players is provided in Table 1. This shows the total number of trials for each player, the total amount of time spent playing (excluding the time taken to change machines, complete bonus sequences and correct machine malfunctions), the total mount staked and won during the session, the percentage won or lost (total won/total staked), and the mean number of plays per minute (total trials/total time).

(Insert Table 1 about here)

Table 1 shows that sessions typically lasted for 18 minutes with players making 225 responses at a mean rate of approximately 12-13 responses per minute. Of the 39 players in the sample, only four made a profit during the session. This is reflected in the

mean payback rate of 81% which was slightly lower than the pre-programmed rate of 85-87% required by legislation in South Australia. Other analyses showed that players obtained a mean of 78 (s.d.=35.5) wins per session, suggesting that wins occurred approximately once every 3 trials (225 trials /78 wins) or every 14 seconds (18 mins./78). No significant group differences were observed for any of these session characteristics (all ts (37) < 1).

(b). *Response rate variations*

Response rate variations were analysed by dividing each session into blocks of 10 trials and calculating the mean inter-response interval and total amount won for each block. Blocks were classified into 4 categories according to the total amount won (0, 1-50, 51-100 and 100 or more credits). For each player it was possible to obtain a mean inter-response rate for blocks containing each of these four amounts.

This method was very similar to that employed by Dickerson et al. who examined response rates in one minutes blocks, which also typically contained 9-10 responses. (see Dickerson et al., 1990, 1991). The only difference was that the total number of credits won was considered rather than whether at least one win of a given size had, or had not occurred. Thus, whereas intervals containing three wins of 40 credits would be treated the same as intervals with one win of this size in Dickerson et al.'s studies, in the present study these intervals were distinguished. This seemed a more logical approach to adopt given that players are likely to regard, e.g., 4 wins of 20 credits as more reinforcing that 1 win of 15 credits. The analysis of intervals with larger amounts (over 100 credits) was not affected by this method of classification because 95% of these intervals contained single wins of over 100 credits, rather than separate smaller wins of less than 100 (e.g., 70 and 60 credits).

Mean inter-response rates for blocks of trials directly associated with each amount won (Current block) are displayed in Table 2, and were analysed using a 2 (Group) x 4 (Win Level) analysis of variance with repeated measures on the second factor. This revealed no significant main effect for group, $F(1,13) < 1$, or Group x Win Level interaction, $F(3,39) < 1$, but a significant main effect for Win Level, $F(3, 39)=11.99$, $p < .001$. Tukey HSD comparisons applied to this result showed that inter-response intervals for intervals containing wins greater than 100 credits were significantly longer

than the other 3 intervals ($p < .05$), but that there were no significant difference between intervals containing no wins or less than 100 credits.

In order to investigate Dickerson et al's (1992) suggestion that large wins influence response patterns in subsequent time periods, a second analysis was conducting using the mean response rates observed in blocks following those analysed above (Next block). The ANOVA, revealed no significant effects, with F-values for all main effects and interactions < 1, disconfirming the hypothesis that variations in response rates would be carried over into subsequent intervals or would be more strongly observed in regular players.

(Insert Table 2 about here)

(c) *Analysis of Expectancy Data*

To determine whether expectancies of winning varied in relation to the level of cash reinforcement, each block of 10 trials was assigned a mean expectancy level by pooling the data for each 10-trial block to obtain the mean expectancy prevailing for the duration of these trials. Means and standard deviations for this analysis are shown in Table 2.

These data were examined using a 2 (Group) x 4 (Win Level) analysis of variance, and this showed revealed no significant main effect for Group, $F(1,12) < 1$, Win Level, $F(3,36)=2.25$, n.s., or interaction between Win Level and Group, $F(3,36) < 1$, suggesting that players were no more confident of winning after having obtained larger wins than they were after having obtained small wins or no wins.

A second analysis examined the nature of expectancy changes made during the sessions. Based upon the ratio of total expectancy changes to the total number of plays, it was found that occasional players (Median=0.12, n=21) were significantly more likely to change their expectancies than regular players (Median=0.05, n=18), $U=53$, $p < .05$[1]. Further analyses examined expectancy changes in relation to winning and losing sequences. Using data only from those 36 subjects whose expectancies changed during the session, it was possible to determine the percentage of expectancy (Exp) changes falling into each of the following 4 categories: (i) net win, exp increase,

[1] Expectancy and stake changes were analysed using Mann-Whitney tests rather than t-tests because of the presence of several outliers (> 3 s.d. from mean). Research by Zimmerman and Zumbo (1990) has shown that the Mann-Whitney test is more powerful than t in such situations.

(ii) net win, exp decrease, (iii) net loss, exp increase, (iv) net loss, exp increase. The percentages for each players were averaged to produce the means presented in Table 3(a).

(Insert Table 3 (a) about here)

These data were analysed using a 2(Group) x 2(Outcome Valence: net win, net loss) x 2(Expectancy Change: positive, negative) analysis of variance, with repeated measures on the second and third factors. This analysis showed no significant main effect for group, $F(1,34) < 1$ (which is to be expected given that both rows should sum to approximately 100%), but a significant main effect for Expectancy Change, $F(1,34)=10.80$, $p < .01$, and Outcome Valence, $F(1,34)=221.3$, $p < .001$.

Inspection of Tables 3(a) shows that these effects were the result of a greater proportion of negative rather than positive expectancy changes, and also a greater proportion of expectancy changes having occurred after losing rather than winning sequences. This second effect was to be expected given that most players in the experiment lost money and would have experienced more losing than winning sequences (see Table 1).

Although no significant interaction was obtained between Outcome Valence and Group, $F(1,34)=1.16$, n.s., there was a significant interaction between Expectancy Change and Outcome Valence, $F(1,34)=18.05$, $p < .001$. Analysis of simple main effects comparing the percentage of expectancy decreases in relation to winning and losing sequences showed that this interaction was the result of relatively more expectancy decreases having been made in relation to losing sequences, $F(1,34)=25.45$, $p < .001$. Again, this was the result of more losing sequences than winning sequences having been experienced by both groups.

No significant 3-way interaction was obtained between Group, Outcome Valence and Expectancy Change, $F(1,34)=3.43$, n.s.. However, as can be observed from Table 3(a), occasional players showed a tendency to increase, rather than decrease, their expectancies following winning sequences, whereas regular gamblers seemed less likely to believe that further wins would follow winning sequences.

(d). *Variations in the amount staked per spin*

There was no signficant difference between the mean amount staked by regular and occasional gamblers, (M=6.69, s.d.=0.38 vs. M=6.79, s.d.=0.63), $t(37) < 1$. However, further analyses of the pattern of stake variations revealed several results of interest. For example, comparison of the relative frequency of stake variations within each group (total number of bet changes/ total number of plays) showed that significantly more stake changes were made by occasional players (Median=0.08, n=21) than regular players (Median=0.02, n=21), U=118, $p < .05$.

Variations in stake size were also examined in relation to the amount won or lost during each change. Using data from those players who changed their bets during the session, the relative percentage of increases or decreases associated with winning or losing sequences were classified using the method described above. The mean percentages for this analysis are presented in Table 3(b).

A 2(Group) x 2(Outcome: net win, net loss) x 2 (Stake change, increase, decrease) analysis of variance applied to these results revealed no significant main effect for Group (both add to 100%) or Group x Outcome interaction (both Fs < 1), or Stake Change main effect, $F(1, 23)=2.73$, n.s., but a significant main effect for Outcome, $F(1,23)=369.60$, $p < .001$, showing that players were significantly more likely to change their stakes when they were losing. Although this was to be expected, given that most players generally lost money when they played, it was of interest to note that both groups were just as likely to increase their stakes when they were losing as they were to decrease them.

(Insert Table 3(b) about here)

Finally, exploratory analyses conducted using Tukey post-hoc tests showed that, although both groups obtained similar proportions of winning and losing intervals (84% losing, 13% losing, 3% break even), regular players showed greater assymetry in their bet changes. Regular players were significantly more likely to increase rather than decrease their bets when winning (M=8.9% vs. 3.6%), and to decrease, rather than increase their bets when losing (M=49.1% vs. 35.1%).

Discussion

In general, the results of this study confirm the results of previous studies by Dickerson et al. (1991, 1992), which have found associations between response rates and variations in cash reinforcement. As shown in Table 2, the response rates of both regular and occasional gamblers were significantly slower during intervals containing larger wins (100 credits or more) than those containing total wins of less than 100 credits. Even when the length of payout sequences are taken into account (e.g., music, sound-effects), it appears that players tend to pause after they have won larger amounts. Such pauses appear to serve as temporary rest periods, in which players engage in a variety of behaviours, including: arm-stretching, smoking, or drinking. These results, therefore, alleviate previous concerns by Walker (1993) that Dickerson's findings may have been confounded by experimenter interference.

Although, as Walker (1993) notes, this trend appears to be inconsistent with traditional operant principles which would predict an increase in response strength with larger reinforcements, it is possible that, as in other types of gambling, e.g., Betting on horse races, (Dickerson, 1979), another type of operant schedule may apply in poker machine gambling. In other words, whereas textbooks have commonly assumed that poker machine gambling is a paradigmatic illustration of variable-ratio responding (Ferster & Skinner, 1957), a less 'linear' schedule may apply. In this case, the most likely candidate may be the fixed-ratio schedule which is associated, not only with rapid responding, but also inter-response pauses or 'rest-periods' (a 'break and run' pattern). Players build up their response rates to a certain asymptotic level, and then decrease them once the desired reinforcement or goal has been obtained. As explained later in this paper, this may occur because players believe that large wins occur periodically rather than after a random number of spins.

In this study, however, no acceleration of responses was observed, with players producing similar response rates in intervals containing no wins and those with small to moderate wins (100 5c credits or less). This result contrasts with the findings of Dickerson et al. (1991, 1992) who found that small or moderate-sized wins gave rise to consistent increases in response rates. It is possible that this discrepancy is linked to differences in the characteristics of the machines used in the present study. In contrast to Dickerson et al.'s studies, this research used 5c machines which tend to reinforce

players more frequently than older 20c machines. Players on 5c machines very rarely encounter intervals with no wins (fewer than 3% of intervals were of this nature compared with 20% in Dickerson' studies), and so their behaviour is maintained more consistently across losing streaks (Interestingly, this was a point which the author was able to confirm with representatitives from the gambling industry who admitted that low-denomination machines were increasingly favoured by the industry because of their ability to maintain behaviour for longer periods).

Further hypotheses investigated in this study were that variations in response rates would be maintained for more than one block of trials (Dickerson et al., 1991, 1992), and that this trend would be more strongly observed in regular players. For example, it was expected that if large wins disrupted play-rates within a given block of trials, slower rates would also be observed in subsequent intervals. As the results in Table 2 show, however, neither of these predictions was confirmed. Although, once again, it could be argued that this is attributable to differences in machine characteristics, a more likely explanation is that the sessions in the present study (mean duration=18 minutes) were too brief to allow the development of consistent, or 'stereotyped' response patterns, apart from those associated with larger reinforcements. Evidence in support of this view is provided by Dickerson et al.'s (1991) study, in which carry-effects were also rarely observed in low frequency players who also persisted for less than twenty minutes.

However, whereas response data were generally disappointing, the analysis of stake variations produced several interesting results. Regular gamblers were significantly less likely to change their bets during the sessions and were more likely to change their stakes in the same direction as previous outcomes. Winning sequences were more likely to be followed by stake increases rather than stake decreases, and losing sequences tended to be followed by stake decreases, rather than increases. Although such variations were not examined in Dickerson et al.'s (1991, 1992) studies, these findings are, nevertheless, consistent with their observation that the behaviour of regular gamblers tends to be more consistent, or 'stereotyped' than that of occasional gamblers.

Furthermore, such results provide additional support for the notion that some aspects of poker machine gambling may be operantly based (Skinner, 1953, 1969). In

this case, positive reinforcement, in the form of winning, leads to an increase in response strength (increased stake size), whereas the absence of reinforcement leads to a decrease in the amount (decreased stake size). Thus, as Dickerson (1979) has previously speculated in his studies of off-course betting agencies, it is possible that more than one schedule of reinforcement may also apply in poker machine gambling. That is, whereas response rates may be maintained by a non-linear schedule, betting behaviour in regular players may be maintained by a simple linear schedule of reinforcement, in which the strength of response and the frequency of reinforcement are positively related. Clearly, further research is required to ascertain the reliability of these findings in sessions of a longer duration and on machines with varying frequencies of reinforcement.

A final issue investigated in this study was the relationship between variations in reinforcement and players' expectancies that the machine would soon pay out a satisfactory win. Of particular interest was to examine whether players tended to decrease their expectancies when winning, and increase them when winning consistent with a belief in the well-known 'gambler's fallacy' (Corney & Cummings, 1985). As shown in Table 2 and 3, however, neither of these predictions was confirmed. Overall expectancy levels did not vary according to level of cash reinforcement, with the only useful findings being that regular players were significantly less likely to change their expectancies, and that both groups were more likely to decrease their expectancies during losing sequences.

While these results appear to confirm Griffiths' (1994) recent suggestion that heuristics and biases may be of limited predictive validity in gambling research, it should also be noted that this result may be partly related to the inadequacy of the measures used. The analysis of expectancy changes in terms of subjective ratings and net wins and losses may be insufficient to discern the presence of any underlying biases. Players make take considerably more information into account when making predictive judgements. Such information might include, for example, their previous experience with the machines and also the overall sequence of outcomes obtained during sessions.

Evidence supporting this contention was obtained through an analysis of video-tape recordings of rituals and verbalised statements. These observations revealed that,

despite the absence of expectancy ratings, players still believed that they could identify which machines were more profitable, and this logic often appeared to be based upon 'gambler's fallacy' thinking. Specifically, it was assumed that because machines had, by law, to maintain a certain return, losses would tend to follow large wins, and wins would follow losses. Wins and losses were expected to come in fixed cycles. Each machine was believed to have a 'hot' period in which wins would be paid out more frequently, but also a prolonged 'cold' or 'hungry' period in which it would pay out very little. The skill, therefore, was to identify which stage in the cycle the machine had reached, and this was often achieved using a number of ritualistic behaviours. Such rituals included dropping coins into the coffer to see how full or empty it sounded, choosing machines which had not paid for some time, avoiding those machines which had just paid out (see also Walker, 1988, 1992). Alternatively, this process involved looking for signs that the machine was about to change 'cycle', such as, for example: good wins at the start, the appearance of high paying symbols, the occurrence of combination rather than scatter wins, to show, as one player expressed it, 'that things were lining up.'

These behaviours are of interest because, in operant terms, they may represent a form of discrimination learning. Through experience with playing poker machines, players learn to 'recognise' (but falsely) the conditions or behaviours which influence the likelihood of reinforcement; and having obtained this information, they adjust their response-rates accordingly. Unfortunately, at the present time, little is known about how these behaviours might develop. Although conditioning theory would suggest that such behaviours might result from coincidental associations between certain actions and outcomes, it is also possible that irrational beliefs, such as the gambler's fallacy, might still be important. For example, it may be that cognitive beliefs provide a basis for this discrimination process, whereas behavioural process 'teach' players ways in which these beliefs can be successfully applied in practice. Further research being conducted by the authors is investigating this possibility.

References

Baron, E., Dickerson, M.G., & Blaszczynski, A. (1995). The scale of gambling choices: a preliminary development of an instrument to measure impaired control of gambling behaviour. In J.O'Conner (Ed.) *High Stakes in the '90s*, Proceedings of the Sixth National Conference of the National Association for Gambling Studies, Fremantle, Western Australia.

Cohen, J. (1972). Psychological probability or the art of doubt. London: George Allen and Unwin Ltd.

Corless, T. & Dickerson, M.G. (1989). Gamblers' self-perceptions of the determinants of impaired control. *British Journal of Addiction*, 84, 1527-1537.

Corney, W.J. & Cummings, W.T. (1985). Gambling behavior and information processing biases. *Journal of Gambling Behavior*, 1, 111-118.

Dickerson, M.G. (1984). *Compulsive gamblers*. London: Longman.

Dickerson, M.G. (1979). FI schedules and persistence at gambling in the UK betting office. *Journal of Applied Behavior Analysis*, 12, 315-323.

Dickerson, M.G. (1989). Gambling: a dependence without a drug. *International Review of Psychiatry*, 1, 157-172.

Dickerson, M.G. (1993). Internal and external determinents of persistent gambling: problems in generalising from one form of gambling to another. *Journal of Gambling Studies*, 9, 225-245.

Dickerson, M.G., Cunningham, R., Legg England, S. & Hinchy, J. (1991). On the determinants of persistent gambling III: Personality, prior mood, and poker machine play. *The International Journal of the Addictions*, 26, 531-548.

Dickerson, M.G., & Hinchy, J., England, S.L., Fabre, J., & Cunningham, R. (1992). On the determinants of persistent gambling behaviour. I. High-frequency poker machine players. *British Journal of Psychology*, 83, 237-248.

Ferster, C.B., & Skinner, B.F. (1957). *Schedules of reinforcement*. New York: Appleton-Century Crofts.

Griffiths, M.D. (1994). The role of cognitive bias and skill in fruit machine gambling. *British Journal of Psychology*, 85, 351-369.

Griffiths, M.D. (1995a). The role of subjective mood states in the maintenance of gambling behaviour. *Journal of Gambling Studies*, 11, 123-135.

Griffiths, M.D. (1995b). *Adolescent Gambling*. London: Routledge.

Jarvik, M.E. (1951). Probability learning and a negative recency effect in the serial anticipation of alternative symbols. *Journal of Experimental Psychology*, 41, 291-297.

Kahneman, D. & Tversky, A. (1972). Subjective probability: a judgement of representativeness. *Cognitive Psychology*, 3, 430-454.

Ladouceur, R., Gaboury, A., Dumont, D, & Rochette, P. (1988). Gambling: relationship between the frequency of wins and irrational thinking. *The Journal of Psychology*, 122, 409-414.

Ladouceur, R., Gaboury, A., Bujold, A., Lachance, N. & Tremblay, S. (1991). Ecological validity of laboratory studies of videopoker gaming. *Journal of Gambling Studies*, 7, 109-116.

Mark, M.M., & Lesieur, H.R. (1992). A feminist critique of problem gambling research. *British Journal of Addiction*, 87, 549-565.

O'Conner, J., Dickerson, M.G., & Phillips, M. (1995). Chasing and its relationship to impaired control over gambling. In J.O'Conner (Ed.) *High Stakes in the '90s*, Proceedings of the Sixth National Conference of the National Association for Gambling Studies, Fremante, Western Australia

Skinner, B.F. (1953). *Science and human behavior*. New York: Free Press.

Skinner, B.F. (1969). *Beyond freedom and dignity*. New York: Knopf.

Wagenaar, W.A. (1988). *Paradoxes of gambling behaviour*. London: Erlbaum.

Walker, M. (1988). The presence of irrational thinking amongst poker machine players, paper presented at the Conference of the National Association for Gambling Studies, NAGS, Canberra.

Walker, M.B. (1992a). Irrational thinking among slot machine players. *Journal of Gambling Studies*, 8, 245-288.

Walker, M. (1992b). *The Psychology of gambling.* Sydney: Pergamon Press.

Winefield, A.H. (1966). Negative recency and event dependence. *The Quarterly Journal of Experimental Psychology,* 18, 47-54.

Zimmerman, D.W. & Zumbo, B. (1990). Effect of outliers on the relative power of parametric and nonparametric statistical tests. *Perceptual and Motor Skills*, 71, 339-349.

Table 1 Mean (s.d.) Session characteristics for occasional (n=21) and regular players (n=18)

	Total Plays (trials)	Total time (mins.)	Amount Staked (credits)	Amount Won (credits)	Win Rate (%)	Play rate (/min)
Occasional players						
Mean	218.2	17.3	1376.3	1140.6	83.1	12.3
S.D.	(108.5)	(7.2)	(620.1)	(653.3)	(22.3)	(1.8)
Regular Players						
Mean	235.9	18.7	1498.1	1189.5	78.3	12.7
S.D.	(104.4)	(7.2)	(688.3)	(747.7)	(23.7)	(2.6)
Overall Mean	226.4	17.9	1432.5	1163.2	80.9	12.5
SD	(106.6)	(7.2)	(651.6)	(696.9)	(22.9)	(2.2)

1. The percentages in column 5=total amount won/total amount bet. One credit= 5 cents.

Table 2 Mean (s.d.) inter-response times (IRT) (in seconds) for current block and subsequent block, and expectancy levels for various levels of cash reinforcement

	Amount won in Block			
	0 Credits	1-50 Credits	51-100 Credits	101+ Credits
IRT(Current Block)				
Occasional	4.34 (1.2)	4.55 (0.9)	5.08 (1.0)	5.95 (1.0)
Regular	5.16 (1.5)	4.75 (0.3)	5.12 (0.4)	6.48 (1.4)
IRT (Next Block)†				
Occasional	4.68 (1.2)	4.73 (0.9)	4.70 (1.0)	4.63 (0.8)
Regular	5.24 (1.2)	5.04 (0.6)	4.94 (0.4)	4.46 (0.7)
Expectancy Level				
Occasional	3.98 (1.7)	4.74 (1.5)	5.45 (1.5)	5.87 (1.2)
Regular	4.32 (2.1)	3.74 (1.5)	4.14 (1.5)	4.71 (1.7)

1. † These figures represent the mean inter-response times for 10-trial blocks which occurred after 0, 1-50, 51-100 or 101 or more credits had been obtained in the previous block.
2. For all analyses (n=21) for occasional players, (n=18) for regular players. The only exception is for the comparison of expectancy figures associated with 0 wins, where (n=10 and 8 respectively).

Table 3 (a) Mean (s.d.) percentage of expectancy (exp) increases or decreases associated with winning and losing sequences.

	Net Wins		Net Losses	
	Exp Inc	Exp Dec	Exp Inc	Exp Dec
Occasional (n=20)	17.7(8.6)	6.4 (5.5)	28.8 (12.0)	46.1 (17.4)
Regular (n=16)	9.6 (9.2)	10.5 (10.0)	33.7 (11.8)	46.3 (10.0)

Table 3 (b) Mean (s.d.) percentage of stake increases or decreases associated with winning and losing sequences.

	Net Wins		Net Losses	
	Stake Inc	Stake Dec	Stake Inc	Stake Dec
Occasional (n=16)	7.4 (8.1)	6.5 (5.3)	40.7 (10.4)	43.0 (11.4)
Regular (n=9)	8.9 (3.8)	3.6 (4.1)	35.7 (6.6)	49.1 (5.2)

Appendix B

Article 2: Based upon Chapter 11

The Validity of 'Speaking-aloud' Studies of Gambling Cognitions

Paul H. Delfabbro
Anthony H. Winefield

Department of Psychology
University of Adelaide

Correspondence to: Paul Delfabbro, Department of Psychology, University of Adelaide, Nth. Tce., 5000.

Abstract

Previous research by Walker (1988; 1992a) has suggested that irrational-thinking may play a central role in the maintenance of behaviour in slot-machine gambling. Analysis of verbalised statements of regular student gamblers (n=9) (Walker, 1992a) has shown that 80% of within-session cognitions refer to irrational beliefs concerning the predicability and controllability of chance-determined outcomes. The present study was undertaken to evaluate the validity of Walker's findings using a larger sample of regular non-student gamblers (n=20), and also to consider what factors predict irrational thinking. The results generally supported Walker's results, with 75% of 'strategic' cognitions found to be irrational, but showed that irrational statements comprised only 14% of total cognitions. Overall irrationality was found to be unrelated to gender, or the amount won, but was predicted by a measure of risk-taking, with greater irrationality observed in players who gambled larger stakes. The validity of the speaking-aloud approach and implications for cognitive-behavioural interventions are discussed.

Although it is well established that most, if not all, gambling activities are unfair and unprofitable for players (Griffiths, 1994; Wagenaar, 1988; Walker, 1992b), people still continue to gamble. Thus, as Walker points out, in trying to explain why people gamble, one is faced with either one of two possibilities: 'either people are not rational or winning money is not the only consideration.' (1992a, p. 246). Typically, previous sociological theories of gambling motivation (Abt & Smith, 1984; Abt, Smith & McGurrin, 1985; Frey, 1984; Goffman, 1967) have tended to support the latter view, arguing that people gamble primarily for rational (non-monetary) reasons including for enjoyment, excitement and socialisation. However, as recent psychological research by Griffiths (1994, 1995) and Walker (1992b) has shown, a substantial proportion of gamblers nevertheless report that 'winning money' is an important motivation for gambling. This motive has been observed not only in those activities which allow a realistic possibility for skilful gambling (e.g. blackjack-Keren & Wagenaar, 1988; horse racing-Dickerson, Walker, Legg-England, Hinchy, 1990), but also in chance-determined activities (e.g., slot machines- Griffiths, 1995; Walker, 1988) where players have little, or no, control over the outcomes. Thus, Walker (1992b) suggests that understanding why people hold this belief or expectation may be of considerable value in explaining persistent gambling behaviour.

This premise has been central to recent cognitive studies of gambling, which have shown that gamblers do not appear to interpret gambling outcomes objectively during gambling sessions (Griffiths, 1994, 1995; Ladouceur & Walker, 1996; Walker, 1992a, 1992b for extensive reviews). These studies have shown that, even people who publically report that money cannot be won from gambling, appear to respond irrationally when they gamble, suggesting that they can influence or predict chance determined outcomes. Such behaviour has been observed, not only in observational studies of gamblers in real-life settings (e.g., craps- Henslin, 1967; roulette-Oldman, 1974; slot machines-Walker, 1988) but also in simulation studies conducted under controlled laboratory conditions (e.g., Burger & Cooper, 1979; Ladouceur & Gaboury, 1988; Ladouceur & Mayrand, 1984; Ladouceur, Tourigny, & Mayrand, 1986; Langer, 1975; Langer and Roth, 1975; Strickland, Lewicki & Katz, 1966; Wolfgang, 1988; Wolfgang, Zenker, Viscusi, 1984). These irrational beliefs have included: (a). The *illusion of control* (Langer, 1975; Langer & Roth, 1975) whereby

gamblers behave as if skill, task-familiarity or practice can influence chance outcomes (e.g., the outcomes of such activities as raffle drawing, number guessing or coin tossing, (b). *Biased evaluations of outcomes*, whereby successes are attributed to personal qualities such as skill and diligence, and failures to external factors such as bad luck or unfair games (Gilovich, 1983; Gilovich & Douglas, 1986), (c). *Erroneous conceptualisation of randomness or probability* (Griffiths, 1996; Ladouceur & Walker, 1996; Wagenaar, 1988), whereby players falsely believe that the probability of future success is related to previous gambling outcomes. For example, players persist through losing sequences because they believe that 'a win is due' (i.e., as based upon gambler's fallacy or 'representiveness bias', Kahneman & Tversky, 1972; Winefield, 1966), or cannot stop gambling when winning because they believe that further wins will follow (i.e., as might be based upon the 'availability bias', Corney & Cummings, 1985; Kahneman, Slovic & Tversky, 1982).

Walker (1992b) has argued that these biases may explain why gamblers falsely believe that money can be won from gambling, and why they should persist when they are losing. However, as he also points out, it has often proved difficult to provide convincing empirical evidence to show that this is so. While anecdotal observations of gambling in real-life settings seemed to provide encouraging evidence to justify more controlled research, experimental studies have not always proved to be successful in demonstrating the existence of clear, consistent effects. Indeed, as Letarte, Ladouceur and Mayrand (1986) noted:

> "A puzzling fact emerged...although the subjects reported an objective perception of the gambling situation...an informal discussion with the subjects after the game was over indicated the presence of many irrational and subjective beliefs..." (p. 299)

In other words, behaviour observed in laboratory studies might not have reflected the players' natural gambling behaviour or beliefs about gambling, because players may have dissembled their intentions so as not to appear foolish in the presence of the experimenter. Thus, in order to address this problem, Ladouceur and his associates' developed a more general and direct method for studying within session cognitions. This was the 'speaking-aloud' method, which involved players having to speak aloud their thoughts while gambling. It was hoped that this technique would reduce the biases (e.g., memory, social desirability) which are likely to occur when people are asked to provide retrospective accounts of their motives and cognitions (Ericsson and

Simon, 1980). This technique was applied initially in studies of simulated/electronic roulette (Ladouceur & Gaboury, 1988; Gaboury & Ladouceur, 1989), and revealed that over 70% of gambling-related (or 'strategic') cognitions were irrational. These irrational beliefs included all of those listed above, and also an array of miscellaneous beliefs, including players' tendency to talk to the machine as if it were alive ('personification of the machine').

The results of this initial study were subsequently confirmed in a further laboratory study of roulette by Ladouceur, Gaboury, Dumont, and Rochette (1988); in video-poker players gambling in an ecologically valid setting by Ladouceur, Gaboury, Bujold, Lachance, and Tremblay (1991) and also by Walker (1992a) using a sample of regular poker machine players in Australia. Although less consistent results were obtained by Griffiths (1994) using fruit machine players in the UK, (2.5% for infrequent players, 14% for regular players), this appears to be due to differences in the method or scoring and the nature of the machines being studied. Whereas Ladouceur et al. examined irrational verbalisations in relation to total gambling-related statements, Griffiths compared them in relation to total cognitions, which consisted mostly of statements unrelated to the game. In addition, as Walker (1992b) pointed out, the UK-style slot machines used by Griffiths allowed some possibility for skilful play through the incorporation of 'hold' features, which may have reduced the need for genuinely irrational strategies.

Unfortunately, although these studies consistently showed that irrational thinking was a common feature of gambling, and that players showed considerable consistency in their cognitions, it is not, however, clear whether verbalised statements genuinely predict and maintain gambling behaviour (Griffiths, 1994, Walker, 1992a). For example, the level of irrationality has been found to be unrelated to reinforcement frequency (Ladcoueur, et al., 1988), or risk-taking (Ladouceur & Gaboury, 1988). Similarly, Griffiths (1994) found no difference between the behaviour of regular and infrequent fruit machine players, despite the fact that the former produced significantly more irrational verbalisations. Thus, as both Griffiths (1992) and Walker (1992a) have argued, the validity of speaking-aloud studies is subject to question. Unless verbalised statements can be shown to have predictive value, they cannot be seen as having a useful role in understanding behaviour. Such statements may instead be little more than

ad hoc descriptions of behaviour that are produced merely to satisfy the requirements of the experiment; the cognitive processes may, in fact, play no part in the players' normal gambling sessions (Griffiths, 1994).

These issues were examined in the present study which utilised a direct observation methodology that allowed simultaneous recordings and comparisons of behaviour, outcomes and verbalised statements. In this study, the validity of Walker's (1992a) are examined using to a slightly larger, more diverse sample of non-tertiary educated gamblers recruited from the community. In addition, following Anderson and Brown (1984), who have suggested that stronger experimental effects are obtained in realistic settings, this study re-examined the relationship between irrational thinking and measures of risk-taking (mean amount wagered) and gambling success (percentage won). It was hypothesised that greater irrationality would be associated with greater risk-taking, but unrelated to the amount won (Ladouceur et al., 1988). Finally, this study further extended previous research by examining the nature of gender differences in irrational thinking. Although such comparisons were not undertaken in previous studies of slot machine gambling because of the predominance of male subjects, Hraba & Lee (1995) and Mark & Lesieur (1992) have suggested that gender-differences need to be examined if results are to be more confidently generalised to all gamblers in the community.

Method

Subjects

Twenty regular poker machine players were recruited via an advertisement placed in a suburban newspaper. This sample consisted of 12 women and 8 men, all of whom played poker machines regularly, on at least a weekly basis. Of the 8 men, 1 (13%) was aged 18-35 years, 6 (76%) were aged between 36 and 55 years, and 1 (13%) was aged over 55 years of age. Of the 12 women, 3 (25%) were aged 18-35 years, 7 (58%) were aged 36-55 years, and 2 (17%) were aged over 55 years. Overall, players reported a mean expenditure per gambling session of $26.67 (s.d.=20.82) and a mean session length of 98.96 minutes (s.d.= 68.92).

Apparatus

Gambling behaviour, outcomes, and verbalisations were recorded using a miniature Sony video-recorder (approximately 20cm in length) with a powerful condenser microphone placed next to the machine during play. The recorder had a wide lens allowing the entire screen and gambling buttons to be filmed at a distance of 30cm. This allowed the recorder to be placed next to the players' arm, so that no part of the players' bodies (apart from their fingers) were in the picture. This recorder could be quickly moved from one machine to the next without disruptions to the recording process.

The poker machines available in the venue did not differ from those in any other gambling venue in South Australia. All 16 were electronic and manufactured by Aristocrat Leisure Industries Pty. Ltd. or Olympic Amusements Pty. Ltd.. Each machine allowed a minimum bet of 5c per spin, allowed bets on 1-5 or 1-9 lines, a maximum bet of 90 credits or 10 credits for 9 lines ($4.50), and had a maximum jackpot of $10,000.

Procedure

The study was conducted in a central gambling venue in the city of Adelaide, South Australia. Players met the experimenter at a mutually convenient time inside the venue, were provided with an information sheet describing the details of the experiment, and were asked to fill out a short questionnaire describing their gambling habits. Players were told that they would receive $20 for participating in the experiment and were given the choice of: (a). Using this money in the experiment and receiving nothing afterwards if they lost it, (b). Using their own money during the experiment and receiving the $20 afterwards. Either way, players were told that they could keep any money they obtained in the experiment. This method was generally consistent with that of Griffiths (1994) and Ladouceur et al. (1991) who have found that allowing players to keep their winnings is sufficient to maintain the validity of gambling experiments.

Players were told to play as naturally as possible, and could choose any machine they liked and change machines whenever they wanted. The only restriction was that they were told to play for at least fifteen minutes so that reasonable number of trials could be recorded. Once this 15 minutes had been completed, players were asked if

they wished to continue. Those who said 'yes' continued with the experiment for as long as they wished (c.f. Griffiths, 1994). Those who had not spent the entire $20 when they ceased playing were free to keep the remainder as a participation fee. Those who ran out of money before this time were free to play with their own money to continue the session.

Instructions

These were similar to those used by Walker (1992a). Participants were told that the purpose of the task was to examine what people were thinking while they were playing poker machines. They were told to speak aloud whatever thoughts occurred to them without any censoring. Following Ladcoueur et al. (1988, 1991), and Griffiths (1994), they were told not to be concerned if what they said did not make sense, was in broken sentences or seemed irrelevant. When each player had decided upon a machine, they were given 2-3 minutes to practise speaking-aloud, and to grow accustomed to the presence of the recording device. During the session, the experimenter sat on a stool several metres from the subject and watched the subjects' progress. If subjects discontinued talking for 30 seconds, they were prompted using statements, which included: 'Please say what you are thinking about the game', or 'Please keep on talking' (Walker, 1992a).

After the session was completed, there was a brief informal debriefing session in which the players were given the opportunity to talk about their experiences during the session, and whether they had experienced any difficulties verbalising their thoughts during the experiment or whether this task had affected their normal gambling behaviour.

Post-Experimental Analysis

When sessions were completed, the recordings were transferred to VHS format and viewed by the experimenter. Scoring was undertaken using the same method as in Chapter 10, with responses and outcomes recorded using an event-recorder. Verbalisations were transcribed in a second viewing session and indexed by trial number so it was possible to match up specific statements with specific events.

Individual verbalisations were defined as those passages of speech on a single topic preceded and followed by a pause (Walker, 1992a).

Results

(a). *Session Characteristics*

Details of the session characteristics for the 20 players is provided in Table 1. This show the total number of trials, the total amount of time spent playing, the total amount staked and won during the session, and the mean number of plays per minute (total trials/total time).

(Insert Table 1 about here)

Table 1 shows that most subjects were able to stay on the machine for the required 15 minutes, and that some persisted for over half an hour. Players produced a mean of 11-12 responses per minute and were reinforced approximately every 3 or 4 spins. Although the overall percentage suggests that players made a profit from playing, a closer inspection of individual player's data revealed this was almost entirely attributable to the success of one player who obtained a 600% return. Overall, 80% of the players lost money when they played. This was reflected in the median return of 72.5% for the sessions as a whole.

(b) *Classification of Verbalisations*

The transcribed verbalisations were content analysed and classified into one of 3 categories: irrational, rational or other. Irrational statements were those which were incorrect or which suggested that players were attempting to influence the outcome of the game in inappropriate ways. Five types of irrational statement were identified, and these were classified using the categories developed by Walker (1992a), Griffiths (1994) and Ladouceur et al. (1988).

(i) *Superstitious Rituals, Hypotheses or Predictions*: These were statements which suggested the use of false strategies or techniques to influence the machine, e.g. "That jigged it up didn't it", "I'll put in a few more coins and that might adjust the

machine", "After a good spit, it's good to go down for a few presses", "Maybe it's going to warm up".

(ii) *Incorrect Linking of Cause and Effect:* These statements suggested that players were making unfounded or illogical associations between events which had no rational connection, e.g. "The more credits you pay, the more likely the scatters are to come up", "I'll try to push another button...you almost feel that the machine can tell."

(iii) *Inappropriate Rationalisation of Near-Misses*: These statements referred to beliefs relating to the fairness of the machine. Any statement which suggested that the machine was cheating, or 'stopping' the player from winning by not providing all the winning symbols was classed as irrational, e.g., "I'll tell you what: that bottle drops a lot down the bottom there. Stops you heaps of times.", "That's why I reckon it's rigged-the bottle keeps dropping there all the time".

(iv) *Personification of the Machine*: Any statement which suggested that players were striking bargains with the machine, attributing human emotions to it, or insulting it, were classed as irrational. Some typical examples included: "This machine might be in a good mood", "All right I'm going to start insulting you", "I'm going to swap machines on you-I will go to your partner next door", "I thought the machine wasn't very kind to me."

(v) *References to Personal Skill*: Any statement which referred to the players' individual abilities, or relative ability compared with other players, was classified as irrational. No statements of this nature emerged in this study.

(vi) Inappropriate *References to Luck*: Statements which referred to personal luck as a quality of the machine or the individual were classified as irrational. Some examples of these statements included: "I would have sworn this machine was lucky", "Come on. Lucky touch", "It's not my lucky day".

Verbalisations were classified as rational if they provided accurate assessments of strategies, odds, or players' ability to control the game. Also included were any

statements relating to decisions or actions undertaken during the game, e.g., the amount of time which the person would continue, the amount that would be staked on each turn, and rational courses of action. Some examples included: "I don't know when it's going to do something. I really don't have a clue", "I'll up my bet to 10, if I don't win, I'll go down", "I'll take out 5 and put 5 back in", "I think I should go down to 5 lines", "I suppose you have to bet big to win big".

The Other category consisted of general descriptive statements relating to specific outcomes of the game ("Hey I won 100 on that one."), descriptions of how the session was going ("Going downhill at a rate of knots"), and other miscellaneous statements about the machine ("So he's the substitute", "I like the colours", "It pays from both sides"). Also included in the Other category were expressions of emotion, ("This is making me really angry", "This is so frustrating"), sarcasm ("Two! Big deal!"), and statements of motivation ("Just as long as I can get some entertainment out of this thing to make it last longer.").

To check the reliability of the coding, a random sample of 5 transcripts was given to a second judge familiar with poker machines. Ninety percent of classifications were similar those (irrational, rational, other) to those of the authors. This figure is consistent with the high reliability coefficients obtained by Ladouceur et al. (1988) and Walker (1992a) using one or more independent judges.

(c) *Level of Irrational Thinking*

The percentage of irrational thinking was assessed in terms of two indices developed by Walker (1990). The first index was based upon the ratio of the total irrational statements (I) produced over the total number of verbalisations recorded (T), where T= Σ (Number of irrational statements (I) + Number of rational statements (R) + Number of Other statements (O)). The second index assessed the irrationality of strategic statements, i.e., statements which related specifically to how the game was being played. This index was the ratio of the total irrational statements (I) over the sum of the number of irrational statements + the number of rational statements, Σ(I + R). These indices were calculated for each player and then averaged to obtain overall percentages of irrational statements for the sample. These individual ratios and the overall percentages are presented in Table 2.

(Insert Table 2 about here)

The overall figures in Table 2 do not provide an entirely accurate reflection of the volume of speech recorded for each subject. Many verbalised statements were 50 words or more in length, others consisted of only one or two words. Nevertheless, there was considerable variation in the amount of speech recorded for each subject, with some speaking almost continuously throughout the session, others relatively infrequently. As can be observed, only 14% of the total statements produced were irrational. However, when analysis was confined only to game-related or strategic verbalisations, this percentage increased to 75%, suggesting a high degree of irrationality in game-related cognitions.

(d) *Gender and Irrationality*

Gender comparisons of these indices showed no significant differences between the percentages of irrational verbalisations produced by men and women (see Table 3).

(Insert Table 3 about here)

(e) *Percentage of Wins and Irrationality*

A third analysis examined these indexes in relation to the percentage return received by each player. The sample was divided into two groups based upon the median percentage return of 72.5%. Group 1 (the High Win group, n=9) obtained a percentage return of 73% or greater, whereas Group 2 (the Low Win Group, n=11) obtained a return of 72% or less. A comparison the percentage of total irrational verbalisations across these two groups revealed no significant difference (see Table 3).

(f) *Risk-taking and Irrationality*

A fourth analysis examined the proportion of verbalisations in relation to the mean amount staked during the session. This mean was derived by dividing the mean total amount staked during the sessions by the mean total number of trials. The median amount staked per turn was 5.0 credits, and this was used to divide the sample into two groups: Higher Risk Group (n=9) who staked more than 5 credits per turn, and

the Low Risk Group (n=11) who staked less than 5 credits per turn. These two groups did not significantly differ in terms of the proportion of men and women or general gambling habits (see Table 3).

(g) *Types of Irrational Verbalisation*

A further analysis examined the relative frequency of each type of irrational statement. Described above, these categories included: superstitious beliefs and predictions, false attributions of cause and effect, inappropriate rationalisation of near-misses and references to personal luck. Overall and gender comparisons of these percentages are presented in Table 4.

(Insert Table 4 about here)

The results in Table 4 show that superstitious rituals and predictions were the most commonly observed type of irrational statement, followed by personalisation of the machine and inappropriate statements of cause and effect. Analysis of these results revealed that women were significantly more likely to personalise the machine than male players.

Discussion

The results of the present study are generally consistent with previous studies (e.g., Gaboury & Ladouceur, 1988; Griffiths, 1994; Ladouceur et al., 1988; Ladouceur et al., 1991; Walker, 1992a) which have employed the 'speaking-aloud' method to examine gambling-related cognitions. Seventy percent of game-related cognitions were found to be irrational, which is similar to 86% obtained by Gaboury and Ladouceur's study of roulette, and 80% reported by both Ladouceur et al. (roulette-1988, video-poker-1991) and Walker (poker machines-1992a). However, in contrast to Walker's (1992a) study, the ratio of irrational statements to total statements was found to be considerably lower (14% vs. 38%), which is more consistent with the percentage obtained by Griffiths (1994) using adolescent fruit machine players in the UK. Although this result would appear to cast doubt on the realibility of the 'speaking-aloud' method in Australian slot-machines studies, several explanations can be

advanced to account for this discrepancy. First, whereas the present study provided players with money to gamble, Walker's players gambled with their own money, which may have reduced the realism of the study and players' motivation to influence the outcomes. Second, whereas Walker's study used gamblers who gambled at least three times per week, players in the present study had to gamble only once per week to qualify for inclusion. Thus, consistent with Griffiths (1994) who has argued that irrationality increases with gambling experience, Walker's players may have had more gambling experience and therefore a wider repertoire of irrational strategies. Third, because the gamblers in the present study were drawn from low socio-economic areas with low levels of tertiary education, they may have been less able to develop strategies to influence the outcomes, or verbalise their thoughts while they were gambling.

This first point has previously been addressed by Ladouceur et al. (1991) who found that players provided with money to gamble produce a similar percentage of irrational statements to those who gamble with their own money. Thus, given that players in the present study were allowed to keep their winnings, this factor is unlikely to have been important. Similarly, in relation to the second point, it is difficult to argue that gambling experience played a role because Ladouceur and his associates have obtained some of the highest percentages using gamblers with very little gambling experience. The third point is, however, more problematic. Although Ladouceur and Griffiths (e.g., Griffiths, 1994; Ladouceur et al., 1991) have obtained results using student subjects which would appear to contradict this argument, there are problems associated with generalising their results to Australian studies. The UK-style slot-machines used by Griffiths are not entirely equivalent to Australian machines (see Walker, 1992a) Furthermore, because Ladouceur's studies have generally only considered strategic statements, it is not possible to determine the 'typical' overall percentage of irrational statements produced by student gamblers in other studies.

Walker's (1992a) solution to this problem has been to make the reasonable assumption that students, because they are better educated, are less likely to be irrational than non-students. However, one could also even argue that the reverse might be true. That is, because students are trained to develop problem-solving skills and to form logical connections between ideas and events, they may be more

susceptible to developing erroneous beliefs when they gamble. Furthermore, because students have superior verbal abilities compared with other members of the community, they may also be better able to justify or describe their behaviour. In other words, the tendency to make irrational statement may be as much a reflection of the players' ability to satisfy the requirements of the experiment as it is of aberrant thought processes.

Clearly, to investigate this hypothesis thoroughly, it would be desirable to conduct a second study which compares the verbalised statements of student and non-student gamblers matched for gambling experience and also on some measure of verbal fluency. Nevertheless, some anecdotal evidence in support of this hypothesis was obtained in the present study by analysing the statements made by players during and after the sessions. These statements showed that several players found the task of verbalising their thoughts extremely difficult. For example, players reported that it was very difficult to speak and gamble at the same time, or to think of things to say because complex thought processes were not a usual feature of their gambling (e.g., " I'm looking at what's happening on the screen, and I can't think of anything else to say"). Some also reported that their gambling was maintained by internal states (e.g., "[I can't]...say very much [because] ...I am very mesmerised by the game."), whereas others, even with extensive prompting, were unable to produce anything more than one or two word responses (e.g., 'Come on!', 'No', 'Damn'). Such difficulties were apparently not experienced to the same degree by Walker (1992a) in his study of student gamblers.

Despite these problems, the results of the present study also suggested that cognitive factors may still be important in slot machine gambling. Not only did the majority of players in the present study make numerous irrational statements, but also the types of irrational verbalisation were consistent with those observed in previous studies, irrespective of the different sample characteristics (e.g., Griffiths, 1994, Ladouceur et al., 1988, 1991; Walker, 1992a). These statements included frequent uses of 'gambler's fallacy logic' ("This is going to win now because it's had a stop", "That's better...I don't think it will pay out again for a while", "Usually when they pay out, you think they will not pay out any more"), and also biased attributions ("I knew I should have increased my bets.") and availability biases (Kahneman, Slovic & Tversky, 1982)

whereby the probability of future outcomes was based upon the frequency of previous events ("Now I'm on a roll", "I'm still getting prizes, so there must be something there!"). Also, in further support of above findings, the percentage of irrational statements was associated with greater risk-taking, which supports Walker's argument that irrationality may increase players' confidence in the ability to predict or influence outcomes

Even more encouraging was the fact that verbalised statements did not appear to be merely ad hoc descriptions of behaviour. On many occasions, players expressed their intention to act before producing the behaviour, and made statements to the effect that their decisions were based upon pre-existing systems of logic. For example, players used phrases such as: 'What I usually do here...", "When this happens, you always think...", "I have a theory that...", "It's always an idea to...." implying that their behaviour in the experiment was representative of their normal behaviour, and based upon previous experience. This was further confirmed by post-session discussions with players in which it was found that they expressed very similar views, and endorsed the same irrational beliefs which they had employed during the sessions.

In this regard, this study reflects similar points raised by Griffiths (1994) in relation to the etiology of cognitive biases, in particular, whether irrational thoughts develop before or during gambling sessions. Our observations suggest that it may depend upon the type of irrational belief. Those relating to randomness and probability are likely to 'exist' outside the gambling session and form part of the general belief-systems of players, e.g., players beliefs about how the machines are programmed. Other beliefs such as superstitious rituals appear to be more context bound. Indeed, as Delfabbro and Winefield (1997) have recently pointed out, it is possible that some irrational beliefs may be based upon a form of discrimination learning. Players develop coincidental associations between certain events and outcomes, and within each session, try to identify the conditions which signify that the machine is about to pay out. Thus, we suggest that cognitive interventions for the treatment of problem gambling (as discussed by Griffiths, 1995; Ladouceur & Walker, 1996; Walker, 1992b) may need to address both types of irrational belief using different techniques. That is, because some irrational beliefs are more general and are related to a misunderstanding of randomness and probability, these could possibly be addressed in consultations

outside the gambling setting. On the other hand, it is likely that 'blocking' superstitious rituals and associations may require a more direct approach. That is, since superstitious rituals are operantly based (possibly related to specific stimulus events), therapists may have to accompany players to gambling venues to observe their behaviour so that inappropriate reinforcers and incentives can be identified (Bandura, 1969). This is because these irrational associations are unlikely to be identified using questionnaires or consultations conducted away from the gambling venue (Walker, 1992b).

Finally, although very little information is presently available concerning the role if individual differences in irrational thinking, the results of the present study suggest that gender may be one variable worthy of further attention. Although women did not produce more irrational statements than men in this study, they were significantly more likely to personalise the machine. Consistent with the explanation advanced by Griffiths (1994) in his study of regular slot-machine players, it may be that women become more emotionally involved when they gamble, and are more likely to treat the machine as an 'electronic friend', with which they can strike bargains and cajole into returning better payouts. If this is so, it may be that the behaviour of women is maintained less by cognitive biases, and more strongly by beliefs relating to the inherent 'fairness' of the activity, for example, that machines should reward players for their time and effort. Further research being planned by the authors will examine the reliability of this finding in samples of slot-machine players with varying levels of gambling experience.

References

Abt, V. & Smith, J.F. (1984). Gambling as play. *Annals of the American Academy of Political and Social Sciences*, 474, 122-132.

Abt, V., Smith, J.F., McGurrin, M.C. (1985). Ritual, risk, and reward: a role of analysis of race track and casino encounters. *Journal of Gambling Behavior*, 1, 64-75.

Anderson, G., & Brown, R.I.F. (1984). Real and laboratory gambling, sensation-seeking and arousal, *British Journal of Psychology*, 75, 405-410.

Bandura, A. (1969). *Principles of behavior modification*. Noew York: Holt, Rinehart & Winston.

Burger, J.M. & Cooper, H.M. (1979). The Desirability of Control. *Motivation and Emotion*, 3, 381-393.

Corney, W.J. & Cummings, W.T. (1985). Gambling behavior and information processing biases. *Journal of Gambling Behavior*, 1, 111-118.

Delfabbro, P.H. & Winefield, A.H. (1997). Poker machine gambling: an analysis of within session characteristics. (paper submitted to *The British Journal of Psychology*).

Dickerson, M., Walker, M., Legg England, S. & Hinchy, J. (1990). Demographic, personality, cognitive and behavioral correlates of off-course betting involvement. *Journal of Gambling Studies*, 6, 165-182.

Ericsson, K.A., & Simon, H.A. (1980). Verbal reports as data, *Psychological Review*. 87, 215-250.

Frey, J.H. (1984). Gambling: a sociological review. *Annals of the American Academy of Politcal and Social Sciences*, 274, 107-121.

Gaboury, A. & Ladouceur, R. (1989). Erroneous perceptions and gambling. *Journal of Social Behavior and Personality*, 4, 411-420.

Gilovich, T. (1983). Biased evaluation and persistence in gambling, *Journal of Personality and Social Psychology*. 44, 1110-1126.

Gilovich, T. & Douglas, C. (1986). Biased evaluations of randomly determined gambling outcomes. *Journal of Experimental Social Psychology*, 22, 228-241.

Goffman, E. (1967). *Interaction ritual: essays on face to face behavior*. Garden City, New York: Doubleday Anchor.

Griffiths, M.D. (1994). The role of cognitive bias and skill in fruit machine gambling. *British Journal of Psychology*, 85, 351-369.

Griffiths, M.D. (1995a). The role of subjective mood states in the maintenance of gambling behaviour. *Journal of Gambling Studies*, 11, 123-135.

Griffiths, M.D. (1995b). *Adolescent Gambling*. London: Routledge.

Henslin, J.M. (1967). Craps and magic. *American Journal of Sociology*, 73, 316-330.

Hraba, J. & Lee, G. (1995). Gender, gambling and problem gambling. Paper presented at the First European Conference on Gaming and Policy Issues, Cambridge, U.K.

Kahneman, D. & Tversky, A. (1972). Subjective probability: a judgement of representativeness. *Cognitive Psychology*, 3, 430-454.

Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgement under uncertainty: heuristics and biases.*London: Cambridge University Press.

Keren, G., & Wagenaar, W.A. (1985). On the psychology of playing blackjack; normative and descriptive considerations with implications for decision theory. *Journal of Experimental Psychology*, 114, 133-158.

Ladouceur, R. & Gaboury, A. (1988). Effects of limited and unlimited stakes on gambling behavior. *Journal of Gambling Behavior*, 4, 119-126.

Ladouceur, R., & Mayrand, M. (1984). Evaluation of the 'illusion of control': type of feedback, outcome sequence, and number of trials amongst regular and occasional gamblers. *The Journal of Psychology*, 117, 37-46.

Ladouceur, R., Tourigny, & Mayrand, M. (1986). Familiarity, group exposure, and risk-taking behavior in gambling. *The Journal of Psychology*, 120, 45-49.

Ladouceur, R., Gaboury, A., Dumont, D, & Rochette, P. (1988). Gambling :relationship between the frequency of wins and irrational thinking. *The Journal of Psychology*, 122, 409-414.

Ladouceur, R., Gaboury, A., Bujold, A., Lachance, N. & Tremblay, S. (1991). Ecological validity of laboratory studies of videopoker gaming. *Journal of Gambling Studies*, 7, 109-116.

Ladouceur, R. & Walker, M.B. (1996). A cognitive perspective on gambling. In P.M. Salkovkis (Ed.) *Trends in cognitive and behavioural therapies*. London: John Wiley and Sons.

Langer, E.J. (1975). The Illusion of Control. *Journal of Personality and Social Psychology*, 32, 311-328.

Langer, E.J., & Roth, J. (1983). Heads you win, tails it's chance: the illusion of control as a function of the sequence of outcomes in a purely chance task. *Journal of Personality and Social Psychology*, 32, 951-955.

Letarte, A., Ladouceur , R, & Mayrand, M. (1986). Primary and secondary illusory control and risk-taking in gambling (roulette). *Psychological Reports*, 58, 299-302.

Mark, M.M., & Lesieur, H.R. (1992). A feminist critique of problem gambling research. *British Journal of Addiction*, 87, 549-565.

Oldman, D. (1974). Chance and skill: a study of roulette. Sociology, 8, 407-426.

Strickland, L.H., Lewicki, R.J. & Katz, A.M. (1966). Temporal orientation and perceived control as determinents of risk-taking. *Journal of Experimental Social Psychology,* 2, 143-151.

Wagenaar, W.A. (1988). *Paradoxes of gambling behaviour*. London: Erlbaum.

Walker, M. (1988). The presence of irrational thinking amongst poker machine players, paper presented at the Conference of the National Association for Gambling Studies, NAGS, Canberra.

Walker, M.B. (1992a). Irrational thinking among slot machine players. *Journal of Gambling Studies*, 8, 245-288.

Walker, M. (1992b). *The Psychology of gambling.* Sydney: Pergamon Press.

Winefield, A.H. (1966). Negative recency and event dependence. *The Quarterly Journal of Experimental Psychology,* 18, 47-54.

Wolfgang, A.K. (1988). Gambling as a function of gender and sensation seeking. *Journal of Gambling Behavior*, 4, 71-77.

Wolfgang, A.K., Zenker, S.I. & Viscusi, T. (1984). Control motivation and the illusion of control in betting on dice. *The Journal of Psychology*, 116, 67-72.

Table 1 Session characteristics for regular poker machine players (n=20).

	Total Plays (trials)	Total time (mins)	Amount Staked (credits)	Number of wins	Amount Won (credits)		Play rate (/min)
						%	
Mean	203.5	17.7	1083.2	57.2	953.1	102.2	11.5
S.D.	(61.7)	(5.5)	(409.9)	(24.6)	(619.8)	(118.9)	(1.6)

1. The percentages in column 6=total amount won/total amount bet. One credit= 5 cents.

Table 2 Mean (s.d.) percentage of irrational statements produced by regular players (n=20)

	Total	Irrational	Rational	Other	I/ total	I/ I + R
Mean	40.0	6.1	4.0	30.0	.14	.75
SD	20.1	6.0	5.7	15.8	.09	.28

Note: The Mean I/I + R is not the Mean (I)/Mean (I) + Mean (R), but rather the mean of all the ratios calculated for each individual player.

Table 3: Mean (s.d.) percentage of overall irrational and irrational strategic statements in relation to gender, win percentage and level of risk-taking.

	Overall Measure	Strategic Statements	t-value
Gender			
Men (n=8)	0.19 (0.11)	0.61 (0.28)	2.00
Women (n=12)	0.11 (0.07)	0.84 (0.23)	1.78
Win Percentage			
High (n=9)	0.16 (0.09)	0.72 (0.26)	<1.00
Low (n=11)	0.13 (0.10)	0.77 (0.30)	<1.00
Risk Level			
High (n=9)	0.18 (0.11)	0.10 (0.06)	2.11*
Low (n=11)	0.77 (0.26)	0.71 (0.30)	< 1.00

* $p < .05$

Table 4 Mean (s.d.) percentages of each type of irrational statement

	Overall (n=20)	Men (n=8)	Women (n=12)	t-value (df=18)
1. Superstitious rituals, beliefs	37.2 (37.7)	34.6 (31.5)	35.8 (42.2)	< 1.00
2. Inappropriate cause & effect	21.6 (25.5)	28.9 (25.8)	16.4 (25.3)	< 1.00
3. Rationalising near-misses	5.2 (22.3)	12.5 (33.1)	0.0 (0.0)	< 1.00
4. Personalising the machine	24.2 (22.6)	5.6 (10.6)	37.7 (31.4)	2.63*
5. Belief in personal luck	11.8 (22.6)	18.5 (33.4)	6.9 (14.8)	< 1.00
Mean number of statements	6.1 (6.0)	8.0 (6.7)	5.0 (5.0)	

1. These figures were determined by calculating percentages for each player and averaging these percentages across the sample.
2. * $p < .05$

Appendix C

Community gambling survey

used in chapters 5 and 6

Introduction

Good Morning/Afternoon/Evening my name is (SAY NAME) from Roy Morgan Research, the people who conduct the Morgan Gallup Poll. Today, we are conducting a survey on behalf of the Department for Family and Community Services of South Australia about leisure activities and would like your help please. This is a confidential survey, and no individuals will be identified.

Q1A: In other for this research to be accurate we need to select people according to a system to make sure we have a good mixture of people. Could you please tell me the number of people aged 18 or over who usually live at this address.

1. One person 18 years and over
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight
9. Nine or more
10. No persons 18 plus living in household.

If REFUSED to mention number of persons in household or no one over 18 (code 10 or 11 on Q1A),SAY: Thank you for your time and assistance. However, we need to know the number of people aged 18 or more who usually live at this address.

If MORE THAN ONE PERSON aged 18 lives in the household (Codes 2 to 9 on Q1A). **GO TO Q1B**

Q1B: Thank you, could I please speak to the ___the oldest person aged 18 or over presently living at this address.

1. Respondent **(Go to Q2)**
2. Changed Respondent **(Go to Q2)**
3. Respondent not available, make appointment. **(Go to Q3)**

Good Morning/Afternoon/Evening my name is (**SAY NAME**) from Roy Morgan Research, the people who conduct the Morgan Gallup Poll. Today, we are conducting a survey on behalf of the Department for Family and Community Services of South Australia about leisure activities and would like your help please. This is a confidential survey, and no individuals will be identified.

Q2: Do you or anyone else in your household work in any of the following organisations: **READ OUT**

1. Market research
2. A TAB/betting agency.
3. The S.A. Lotteries Commission.
4. The S.A. Hotels Association.
5. The S.A. Licensed Clubs Association.
6. Management at the Adelaide Casino.
7. None of the above **(DO NOT READ)**

If had someone work in organisation mentioned, (Code 1 to 6 in Q2) **SAY**: Thank you for your time and assistance, but for this survey we need to speak to households where no person works in any of the organisations mentioned.

Q3: Would you mind telling me your age please? (**DO NOT READ**)

1. UNDER 18
2. 18-19
3. 20-24
4. 25-29
5. 30-34
6. 35-39
7. 40-44
8. 45-49
9. 50-54
10. 55-59
11. 60-64
12. 65-69
13. 70-74
14. 75-79
15. 80 or over
16. Refused

If AGE is UNDER 18 or REFUSED (Code 1 or 16 on Q3), **SAY**: Thankyou for your time and assistance, but for this survey we need to speak to people 18 years or over.

Q4: Which of the following leisure activities have you done in the last 12 months? Have you (**READ OUT**)

If OTHER, HIGHLIGHT OTHER AND TYPE IN RESPONSE

1. Been on an overseas holiday
2. Played competition sport.
3. Been to a movie.
4. Tried any form of gambling activity, for example, Cross-lotto, poker machines, Casino games or any other form of betting activity.
5. Been to a hotel for a drink only.
6. Been to a concert
7. None of these/Can't say (**DON'T READ**)

If response 1-3, 5-7, **ASK**:

Q5A: As you probably know, gambling is a popular leisure activity for many people. Please could you tell me whether YOU have participated in any of the following activities during the last 12 months? Have you (**READ OUT**):

1. Placed a bet on a horse-race.
2. Placed a bet on the trots or greyhounds.
3. Placed a bet on sporting events.
4. Bought a Cross-lotto, Super-66, or pools ticket.
5. Bought a scratch ticket, instant win game, or played bingo in a club or hall.
6. Bought a keno ticket.
7. Played poker machines: those in which the reels or symbols spin around.
8. Played video-card games (e.g., video poker or video blackjack).
9. Played video-keno.
10. Gambled at the Casino on card or dice games.
11. Gambled at the Casino on the roulette tables.
12. Have you participated in any other gambling activity during the last 12 months (Please specify one only).
13. None of these (**Do not read**)

If tried any form of gambling (Code 4 on Q4), **ASK**:

Q5B: You mentioned that you have participated in some gambling activities in the last 12 months. Please tell me in which of the following activities you have participated during the last 12 months? Have you... **(READ OUT)**:

1. Placed a bet on a horse-race.
2. Placed a bet on the trots or greyhounds.
3. Placed a bet on sporting events.
4. Bought a Cross-lotto, Super-66, or pools ticket.
5. Bought a scratch ticket, instant win game, or played bingo in a club or hall.
6. Bought a keno ticket.
7. Played poker machines: those in which the reels or symbols spin around.
8. Played video-card games (e.g., video poker or video blackjack).
9. Played video-keno.
10. Gambled at the Casino on card or dice games.
11. Gambled at the Casino on the roulette tables.
12. Have you participated in any other gambling activity during the last 12 months (Please specify one only).
13. None of these (**DO NOT READ**)

If participated in gambling activities mentioned, **ASK**: I would now like to ask you a few details about some of the activities you mentioned.

Q6a-Q6l: Now thinking about (see below), how often during the last 12 months have you: (**Repeat for all activities undertaken in Q5a or Q5b**)

Q6a. placed a bet on horse-races.
Q6b. placed a bet on the trots or greyhounds.
Q6c. placed a bet on sporting events.
Q6d bought a Cross-lotto, Super-66, or pools ticket.
Q6e. bought a scratch ticket, instant win game, or played bingo in a club or hall.
Q6f. bought a keno ticket.
Q6g. played poker machines: those in which the reels or symbols spin around.
Q6h. played video-card games (e.g., video poker or video blackjack).
Q6i. played video-keno.
Q6j. gambled at the Casino on card or dice games.
Q6k. gambled at the Casino on the roulette tables.
Q6l. gambled on (insert name from Q5)

The frequency scale for **Q6a-Q6l** was as follows:

1. Once per year or less
2. 2-4 times per year
3. 5-11 times a year
4. Once per month
5. 2-3 times a month
6. Once or twice per week
7. 3-6 times per week
8. 7 or more times per week
9. Never (**DO NOT READ**)
10. Can't Say (**DO NOT READ**)

Q7a-Q7l: Would you please me how much money you usually spend in total on these occasions? (**Record amount in dollars for all activities undertaken in Q5a and Q5b)**

Q7a. when you gamble on horse-races.
Q7b. when a bet on the trots or greyhounds.
Q7c. when you bet on sporting events.
Q7d when you buy Cross-lotto, Super-66, or pools tickets.
Q7e. when you play scratch ticket, instant win game, or played bingo in a club or hall.
Q7f. when you play keno.
Q7g. when you play poker machines: those in which the reels or symbols spin around.
Q7h. when you play video-card games (e.g., video poker or video blackjack).
Q7i. when you play video-keno.
Q7j. when you gamble at the Casino on card or dice games.
Q7k. when you gamble at the Casino on the roulette tables.
Q7l. when you gamble on (insert name from Q5)

SAY: The next questions are general questions that relate to your level of involvement in gambling activities during a typical week.

ASK those who have participated in gambling activities.

Q8a: How much money in total in total would you usually spend in a typical week on gambling activities? That is, the amount you actually take with to spend overall? (**Record Amount in Dollars**)

Q8b: An how much of this (amount given in Q8a) do usually get back or get to keep? By this, I mean: how much is usually left after considering the amounts you have typically lost or won? (**Record Amount in dollars**)

If gamble regularly codes (6 to 8) on questions Q6a to Q6l then **SAY**: I am now going to read out a series of statements that relate to some of the more general aspects of people's gambling behaviour. Please tell me the degree to which any of these statements has applied to YOU PERSONALLY during the LAST SIX MONTHS.

Q9a: When you gamble, how often do you go back another day to win back money you lost? Would you say... (**READ OUT**)

1. Never
2. Sometimes/less than half the time
3. Most of the time I lost
4. Every time they lost
5. Can't say (**DO NOT READ**)
6. Refused (**DO NOT READ**)

Q9b: Have you ever claimed to be winning money gambling when you really had lost? Would you say...(**READ OUT**)

1. Never
2. Yes, less than half the time I lost
3. Yes, most of the time
4. Can't say (**DO NOT READ**)
5. Refused (**DO NOT READ**)

Q9c: Do you feel you have had a problem with gambling or that your gambling was out of control? Would you say....(**READ OUT**)

1. Yes, in the past, but not now.
2. Yes, I feel this way now
3. No, I haven't
4. Can't say (**DO NOT READ**)
5. Refused (**DO NOT READ**)

Q9d: Did you gamble more than you intended to? Would you say...(**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9e: Have people criticised your gambling? Would you say... (**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9f: Have you felt guilty about the way you gamble or what happens when you gamble. Would you say...(**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9g: Have you felt that you would like to stop gambling but didn't think that you could? Would you say...(**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9h: Have you hidden betting slips, gambling money, or any other sign of gambling from your partner, children or other important people in your life? Would you say...(**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9i: Have you argued with people you live with about how generally handle money? Would you say...(**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

If EVER ARGUED WITH PEOPLE LIVE WITH (Code 1 on Q9i), **ASK**:

Q9j: Have money arguments ever centred on your gambling? Would you say...(**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9k: Have you ever borrowed money someone and not paid them back because of your gambling? Would you say... (**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9l: Have you ever lost time from work or study because of gambling/ Would you say...(**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9m: Have you ever borrowed money to pay off gambling debts? Would you say... (**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q9n: Have you ever borrowed money to gamble or to pay gambling debts from household money? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9o: Have you ever borrowed money to gamble or to pay gambling debts from your spouse or partner? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9p: Have you ever borrowed money to gamble or to pay gambling debts from other relatives of in-laws? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9q: Have you ever borrowed money to gamble or to pay gambling debts from banks, finance companies or credits unions? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9r: Have you ever borrowed money to gamble or to pay gambling debts from credits cards? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9s: Have you ever borrowed money to gamble or to pay gambling debts from high interest rate finance companies? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9t: Have you ever borrowed money to gamble or to pay gambling debts from cashing in stocks, bonds, or other securities? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9u: Have you ever borrowed money to gamble or to pay gambling debts from selling personal or family property? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

Q9v: Have you ever borrowed money to gamble or to pay gambling debts from writing cheques knowing there was no money in the account? (**DO NOT AID**).

1. Yes
2. No
3. Can't say
4. Refused

I am now going to read out a number of statements which deal with some specific aspects of people's gambling (**ROTATE QUESTIONS**)

Q10a: In the last 6 months have you ever suffered from depression related to your gambling? Would you say...(**READ OUT**)

1. Never
2. Sometimes
3. Most of the time
4. Nearly always
5. Can't say **(DO NOT READ)**
6. Refused **(DO NOT READ)**

Q10b: In the last 6 months has gambling left you with not enough time to look after your family's interests. Would you say...(**READ OUT**)

1. Never
2. Sometimes
3. Most of the time
4. Nearly always
5. Can't say **(DO NOT READ)**
6. Refused **(DO NOT READ)**

Q10c: In the last 6 months have you ever gambled more than you could afford? Would you say...(**READ OUT**)

1. Never
2. Sometimes
3. Most of the time
4. Nearly always
5. Can't say **(DO NOT READ)**
6. Refused **(DO NOT READ)**

I am now going to ask you some final questions relating to your own experiences with gambling during the last 6 months. For each of these, you will only need to answer 'yes' or 'no'.

Q11a: Has gambling damaged an important relationship in your life? (**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q11b: Do you presently own money as a result of your gambling? (**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q11c: Have you lost a job because of gambling? (**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

Q11d: Have you thought about committing a crime to finance your gambling? (**DO NOT AID**)

1. Yes
2. No
3. Can't say
4. Refused

To make sure we have a true cross-section of people, I'd like to ask you a few questions about yourself.

Q12: Are you married, separated, divorced, widowed, de facto, engaged, planning to marry or single?

1. Married
2. Separated
3. Divorced
4. Widowed
5. De facto
6. Engaged
7. Planning to marry
8. Single
9. Refused

Q13: Are you in paid employment?

If YES, **ASK**: Is that full-time for 35 hours or more per week, or part-time?

1. Yes, full-time (Go to Q15)
2. Yes, part-time (Go to Q15)
3. No (Go to Q14)

Q14: Are you now looking for a paid job?

If LOOKING, **ASK**: a full-time job for 35 hours or more per week, or a part-time job?

If NOT LOOKING, **ASK**: Are you retired, a student, a non-worker, or in home duties?

1. Looking for full-time
2. Looking for part-time
3. Retired
4. Student
5. Non-worker
6. Home duties
7. Refused

Q35: What is your occupation- the position and industry?

1. Professional
2. Business owner or executive
3. Owner of small business
4. Sales
5. Semi-professional
6. Other white collar
7. Skilled
8. Semi-skilled
9. Unskilled
10. Farm owners
11. Farm worker
12. No occupation

Q36: Would you mind telling me the approximate total household income from all sources, before tax? (**IF CANT SAY**, **ASK**: well your bet guess)

1. Less than $10,000 per year
2. $10,000-$14,999
3. $15,000-$19,999
4. $20,000-$24,999
5. $25,000-$29,999
6. $30,000-$34,999
7. $35,000-$39,999
8. $40,000-$44,999
9. $45,000-$49,999
10. $50,000-$54,999
11. $55,000-$59,999
12. $60,000-$64.999

13. $65,000-$69,999
14. $70,000-$74,999
15. $75,000-$79,999
16. $80,000-$84,999
17. $85,000-$89,999
18. $90,000-$94,999
19. $95,000-$99,999
20. $100,000 or more
21. Can't say
22. Refused

Q36: Record sex of respondent:

1. Male
2. Female

Thankyou for your time and assistance. Your opinions are valuable to us and once again we would like to inform you that your responses are entirely confidential and will be used for statistical purposes only.

Appendix D

Scoring the SOGS and recoding of demographic categories used in chapters 5 and 6

SOGS Scoring Method:

Score 1 point if:

Q9a: Most of the time I lost, Every time I lost.
Q9b: Yes, less than half the times I lost, Yes, most of the time.
Q9c: Yes, in the past but not now, Yes, I feel this way now.
Q9d: Yes
Q9e: Yes
Q9f: Yes
Q9g: Yes
Q9h: Yes
Q9i: Not counted
Q9j: Yes
Q9k: Yes
Q9l: Yes
Q9m: Not counted (but included in the study re: borrowed money to gamble or pay gambling debts.
Q9n: Yes
Q9o: Yes
Q9p: Yes
Q9q: Yes
Q9r: Yes
Q9s: Yes
Q9t: Yes
Q9u: Yes
Q9v: Yes

Recoding Categorical Data

Q12: Personal/Marital Status

1. Married
2. Separated
3. Divorced
4. Widowed
5. De facto
6. Engaged
7. Planning to marry
8. Single
9. Refused

Collapsed into 6 categories

(1=Married, 2=Separated + Divorced, 3=Widowed, 4=De facto, 5=Engaged + Planning to marry, 6= Single)

Q35: Occupational Categories

1. Professional
2. Owners or executive
3. Owner of small business
4. Sales
5. Semi-professional
6. Other white collar
7. Skilled
8. Semi-skilled
9. Unskilled
10. Farm owners
11. Farm worker
12. No occupation

Collapsed into 3 categories

(1=White Collar= professional + owners and executives + sales + other white collar, 2=Blue Collar=skilled + semi-skilled + unskilled + farmworkers, 3=business owners= small business owners + farm owners)

Appendix E

Casino Gambling Survey

Used in Chapter 7

CASINO GAMBLING SURVEY:

Ref. No. ☐☐

Date ☐☐☐

Age of Respondent ☐☐

Sex of Respondent ☐

Respondent's Suburb _____

1). Current Gambling Activities:

How often have you played each of the following games within the last 12 months? Please place a tick in the box which most closely approximates how often you play (Note: the term poker-machine refers to all slot-machine games that involve matching rows of symbols to win, e.g. fruit, cards, cartoon figures, etc.)

Frequency of Gambling

Game	daily or more often	3-6 times per week	Once or twice per week	1 to 3 times per month	1-5 times every 6 months	Less than once every 6 months	Never
blackjack							
club bingo							
club keno							
cross lotto							
craps/dice							
lucky tickets							
poker mach.							
roulette							
TAB racing							
TAB sports							
table poker							
two-up							
video bjack							
video keno							
video poker							
.....							
.....							

2). Skill in Gambling

How much skill do you think is involved in each of the following forms of gambling? That is, do you think a player can improve his or her chance of winning by: a). using strategies, b). certain playing styles, or c). by gaining practice in the game?

Game	All chance			Moderate Skill			Very High Skill
blackjack	1	2	3	4	5	6	7
club bingo	1	2	3	4	5	6	7
club keno	1	2	3	4	5	6	7
cross-lotto	1	2	3	4	5	6	7
craps/dice	1	2	3	4	5	6	7
lucky ticket	1	2	3	4	5	6	7
poker mach	1	2	3	4	5	6	7
roulette	1	2	3	4	5	6	7
TAB races	1	2	3	4	5	6	7
TAB sport	1	2	3	4	5	6	7
table poker	1	2	3	4	5	6	7
two-up	1	2	3	4	5	6	7
video-keno	1	2	3	4	5	6	7
video-poke	1	2	3	4	5	6	7
video-bjac	1	2	3	4	5	6	7
other:	1	2	3	4	5	6	7

5). Personal Skill

How much skill do YOU personally have in each of these forms of gambling? (1=you think it's all just chance, 7=you think it's a game of pure skill)

Game	All chance			Moderate Skill			Very High Skill
blackjack	1	2	3	4	5	6	7
club bingo	1	2	3	4	5	6	7
club keno	1	2	3	4	5	6	7
cross-lotto	1	2	3	4	5	6	7
craps/dice	1	2	3	4	5	6	7
lucky ticket	1	2	3	4	5	6	7
poker mach	1	2	3	4	5	6	7
roulette	1	2	3	4	5	6	7
TAB races	1	2	3	4	5	6	7
TAB sport	1	2	3	4	5	6	7
table poker	1	2	3	4	5	6	7
two-up	1	2	3	4	5	6	7
video-keno	1	2	3	4	5	6	7
video-poke	1	2	3	4	5	6	7
video-bjac	1	2	3	4	5	6	7
other:	1	2	3	4	5	6	7

3). Reasons For Not Playing Blackjack

If, in earlier questions, you responded that you do NOT play blackjack could you indicate the reasons why you don't like this activity (Note: If you play blackjack, please leave this question unanswered and go on to Question 4).

1). You do not know the rules.

1	2	3	4	5	6	7
not important			moderately important			very important.

2). The game requires too much skill and concentration.

1	2	3	4	5	6	7
not important			moderately important			very important.

3). You are intimidated by the presence of other people at the tables.

1	2	3	4	5	6	7
not important			moderately important			very important.

4). You are out off by the fact that few women play the game.

1	2	3	4	5	6	7
not important			moderately important			very important.

5). Are there any other factors which you think are important? Please give details below:

_____

_____

_____

_____

_____

_____

_____

4). Reasons for Gambling

How important are the following factors in determining why you gamble? Please place a circle around the appropriate number:

	Not Important.			Moderately Important			Very Important
	1	**2**	**3**	**4**	**5**	**6**	**7**
Enjoyment:	1	2	3	4	5	6	7
Winning Money:	1	2	3	4	5	6	7
Testing your skill:	1	2	3	4	5	6	7
Trying one's luck:	1	2	3	4	5	6	7
To socialise:	1	2	3	4	5	6	7
To escape worry:	1	2	3	4	5	6	7
To Relax:	1	2	3	4	5	6	7
Other	1	2	3	4	5	6	7
Other	1	2	3	4	5	6	7

5). Use of Skill and Luck in Gambling

The following questions relate to general aspects of your casino gambling. Please answer each question by placing a ring around (yes or no):

a). When you are doing well, this is more likely to be the result of your skilful playing than just a lucky streak? (Yes/ No)

b). Before playing a game, do you examine the odds to determine your chance of winning? (Yes/ No)

c). Have you read any books on how to beat the odds or improve your chance of winning in any games or activities? (Yes/ No)

d). When you gamble, do you use any strategies to improve your chances of winning? (Yes / No)

If 'Yes' could you please provide details of the strategies you use and also the activity or activities in which they are used?

If 'No' please go on to question (e).

(e). Do you have your own lucky numbers when playing keno, roulette, bingo, lotto or any other number game? (Yes / No)

(f). Do you believe that some tables or machines are luckier than others? (Yes / No)

(g). Do you believe that some gamblers are just naturally lucky? (Yes/No).

(h). Do engage in any superstitious rituals (e.g., blowing on dice, rubbing machines, etc.) when you are gambling? (Yes/ No)

If 'Yes' please give details of this behaviour and the activities to which it applies:

If 'No' please go on to question (I).

(i). Have you ever brought a lucky charm or lucky object along to the Casino? (Yes / No)

(j). If you do not achieve success when you are gambling on a particular day or night, do you sometimes leave earlier than intended because you believe it is not your lucky day? (Yes / No)

6). Reasons for continuing to gamble:

No doubt there have been occasions when you have gambled a little longer than you would have liked. What factor(s) do you think sometimes make it hard for you to stop gambling, even after you have lost quite a lot of money:

a). You can't bear the thought of walking out wondering if the jackpot or a large win might have been only just around the corner.

1	2	3	4	5	6	7
Never			Quite Often			Always

b). You are enjoying things too much to give up.

1	2	3	4	5	6	7
Never			Quite Often			Always

c). You believe that your luck will eventually change.

1	2	3	4	5	6	7
Never			Quite Often			Always

d). You believe that by playing well, you can recoup your losses.

1	2	3	4	5	6	7
Never			Quite Often			Always

Appendix F

Gambling Survey

Used in Chapter 8

POKER MACHINE SURVEY Ref. ☐☐

(1). Gender

M ☐ 1
F ☐ 2

☐ (c1)

(2). Approximate Age

18-24 yrs .	☐	1
25-34	☐	2
35-44	☐	3
45-54	☐	4
55-64	☐	5
65+	☐	6

☐ (c2)

(3). How often do you gamble on poker machines?

Never	☐	1
Once /year or less	☐	2
2-4 times per year	☐	3
5-11 times per year	☐	4
Once a month	☐	5
2-3 times a month	☐	6
Once or twice per week	☐	7
3-6 times per week	☐	8
Daily or more often	☐	9

☐ (c3)

(4). How much money do you usually spent each time you play?

$☐☐☐☐ (c4)

(5). What is the largest amount you have ever won in a single session of gambling?

$☐☐☐☐ (c5)

(6). What is the largest amount you have ever lost in a single session of gambling?

$☐☐☐☐ (c6)

(7). How much time (in minutes) do you usually spend playing in each session of gambling?

☐☐☐☐ (c7)

(8). How long have you been playing poker machines?

Less than 1 month	☐ 1	
1-3 months	☐ 2	
4-5 months	☐ 3	
6-11 months	☐ 4	
1-2 years	☐ 5	
3-4 years	☐ 6	
5 or more years	☐ 7	☐ (c8)

(9). How important are the following factors in determining why you play poker machines?

[PLEASE ANSWER ALL Qs]

	Not Impt. 1	2	Quite Impt. 3	4	Very impt. 5	
To win money:	☐	☐	☐	☐	☐	☐ (c9)
For enjoyment	☐	☐	☐	☐	☐	☐ (c10)
For the excitement	☐	☐	☐	☐	☐	☐ (c11)
To try your luck	☐	☐	☐	☐	☐	☐ (c12)
To test your skills	☐	☐	☐	☐	☐	☐ (c13)
To escape boredom	☐	☐	☐	☐	☐	☐ (c14)
To escape worry	☐	☐	☐	☐	☐	☐ (c15)
To escape depression	☐	☐	☐	☐	☐	☐ (c16)
To socialise with others:	☐	☐	☐	☐	☐	☐ (c17)
Other (please specify) _____						

(10). Do you participate in any other gambling activities (i.e., apart from poker machines) ?

Yes	☐ 1 **Go to Q11**	
No	☐ 2 **Go to Q12**	☐ (c18)

(11). On what other activities do you gamble ?

[Mark as many boxes as applicable]

Casino games (roulette, cards, dice)	☐ (c19)
Racing activities	☐ (c20)
Sports betting	☐ (c21)
Lotteries	☐ (c22)
Bingo/scratch tickets	☐ (c23)
Keno	☐ (c24)
Other (please specify) _____	☐ (c25)

(12). How much skill do you think is involved in playing poker machines?

None (it's all chance)	☐ 1	
Very little skill (mostly chance)	☐ 2	
Moderate skill (half chance, half skill)	☐ 3	
High skill (mostly skill)	☐ 4	
Very high skill (all skill)	☐ 5	☐ (c26)

(13). How skilful in playing poker machines are you compared with the average person?

Totally unskilled	☐ 1	
Below average skill	☐ 2	
Average skill	☐ 3	
Above average skill	☐ 4	
Totally skilled	☐ 5	☐ (c27)

(14). How do you usually feel <u>before</u> playing poker machines?

[Mark more than one box, if applicable]

Good mood	☐ 1	☐ (c28)
Bad mood/angry	☐ 2	☐ (c29)
Excited	☐ 3	☐ (c30)
Depressed/fed up	☐ 4	☐ (c31)
None of the above	☐ 5	☐ (c32)

(15). How do you usually feel <u>while</u> playing poker machines?

[Mark more than one box, if applicable]

Good mood	☐ 1	☐ (c33)
Bad mood/angry	☐ 2	☐ (c34)
Excited	☐ 3	☐ (c35)
Depressed/fed up	☐ 4	☐ (c36)
None of the above	☐ 5	☐ (c37)

(16). How do you usually feel <u>after</u> playing poker machines?

[Mark more than one box, if applicable]

Good mood	☐ **1**	☐	**(c38)**
Bad mood/angry	☐ **2**	☐	**(c39)**
Excited	☐ **3**	☐	**(c40)**
Depressed/fed up	☐ **4**	☐	**(c41)**
None of the above	☐ **5**	☐	**(c42)**

(17). How much would you consider to be a <u>large</u> win for a single spin?

Amount in dollars $ ☐☐☐☐ **(c43)**

Number of credits ☐☐☐☐ **(c44)**

(18). How much would you consider a 'good-sized win' for a single spin?

Amount in dollars $ ☐☐☐☐ **(c45)**

Number of credits ☐☐☐☐ **(c46)**

Appendix G

Instructions and score sheets used in Chapter 9

Instructions read to subjects

The aim of this experiment is to examine whether real world poker-machine playing can be effectively simulated under more controlled experimental conditions. As a subject in this study, your task will be to play a real life 5-reel fruit-machine for about 40 minutes. You will not need to use any of your own money to play because $50 worth of change will be provided to you (and to all players) at the start of the session. Your aim will be to win as much money as you can in this period, with the agreement being that you can keep whatever net winnings you obtain. So, for example, if you put $40 worth of coins into the machine and end up with $50, then you will receive $10.

This session will be divided into two parts. In the first part, I will allow you to play freely without interruptions, whereas during the second part I will ask you to speak aloud your expectation of obtaining a good-sized win every 30 seconds. A 7 point rating scale will placed upon the machine and you can rate your confidence out of 7, where 1=not at all confident, 4= moderately confident, 7=extremely confident. Can you tell me what you could consider to be a good-sized win _____? OK, now when the expectancy measures begin, I want you to rate your expectation of obtaining a win of ____ or more in the next 10 trials.

Do you have other questions you would like to ask before we begin.

(Ref. .....)

Record Sheet: Poker Machine Study

No.	Win	Exp	IRI	notes		No.	Win	Exp	IRI	notes
1.						1.				
2.						2.				
3.						3.				
4.						4.				
5.						5.				
6.						6.				
7.						7.				
8.						8.				
9.						9.				
10.						10.				
11.						11.				
12.						12.				
13.						13.				
14.						14.				
15.						15.				
16.						16.				
17.						17.				
18.						18.				
19.						19.				
20.						20.				
Total time						Total time				

Legend: Win=amount won in a single spin.
Exp.= expectancy of winning in next 10 trials
IRI=inter-response intervals

Appendix H

Instructions used in

Chapter 10

Information Sheet/ Instructions

●The aim of this study is increase our understanding of the factors which help to maintain people's interest in poker machines. Why do people find poker machines exciting, and what are their perceptions of the games? Do people use systems of strategies when they gamble, or do they believe that it's all just luck? In this study, you will be given some money to play the poker machine of your choice. I will give you $10-20 to start you off (and add some of your own money as well, if you like-this will make it more realistic). Those who only need $10 from me to get them started will get $10 afterwards for taking part in the study. (i.e., everyone gets $20 overall).

● If you are an experienced player, $10-20 might not seem very much because you are accustomed to making larger bets, but try to stay on the machine for at least 15 minutes. This is so that I can obtain enough information for this study. After that, you are free to stop whenever you like.

● During the game I will ask you to indicate (a rating out of 10) how confident you are that the machine is going to pay out in the next 1-10 trials. This is a very important part of the study. Please try to give a rating fairly often, e.g., at least every 30 seconds.

● In addition, to make the game a bit more relaxing and to avoid having to stare at you while you have playing, I have set up a mini-cam. next to the machine. This is focussed upon the screen only. Players themselves are **not** filmed. All I will see is a few anonymous fingers touching the screen!

When you are clear about what the study involves, please sign the attached consent from. This form confirms the anonymity and confidentiality of the study and that the information collected is purely for research purposes.

Thank you for your help with this study.

Paul Delfabbro
Univeristy of Adelaide

Appendix I

Verbalised statements recorded

in poker machine study 4

Subject 1

Trial	Statement
7	I'm not sure if I'm going to win or lose at the present moment. Now I'm thinking playing 7 lines and I'm thinking I'm not confident-the more I play."
14	Overall, I don't think I've got much chance of getting anything out of this. My confidence is low, but my addiction or drive is there still. The ambition is there.
15	I've lost 5 coins and have 14 dollars left
16	I'll bet 7 because this is supposed to be good I'm told
23	I'm still getting prizes, so there must be something, even if they are small.
29	Look at that! Terrible! Only one of the 7 lines!
31	Since I won- that's what I usually do. Go down the lines. Put coins in. It might adjust
	the machine for me. Do something different.
33	I'm waiting for those eggs though.
34	What has been typical for me lately has been to play 3 lines until the eggs come out. Then again I do not want to miss out on the 5th line-just in case.
38	Three of them and it would be all right
40	Dead. So, I'm thinking about playing only 3 lines again.
42	Four in a row. Fantastic. I'm on 5 lines, but I was going to go down to 3 lines which is worse. I need more canaries. Bigger wins. More canaries. Come on. Give me something. Come on, give me prizes. Dirty stinker-after playing all that time!
47	I'm feeling disappointed that I didn't up my bet when 4 eggs came out. I've got an idea that I know when it's coming out., and I say-why didn't you do that and you really feel angry with yourself or mad...disappointed.
52	I'll play 7 lines because I got that win. That ought to help me for a while.
56	Just as long as I can get some entertainment out of this thing to make it last longer.
57	Yes, 7 lines at least-but I should have upped the bet a bit more. I had a feeling that something would come out. Canaries. Come on. Something-at least that will keep me going for a while.
61	I've lost $10- 5$ in the machine. That's OK. I'll keep that separate so I know where I stand. I'll up my bet to 10. If I don't win on that I'll go down.
64	Three of these and it will be great.
66	I'm feeling OK. I've stabilised. I've got $14 and I've been playing all that time and I got a chance because those eggs came up.
68	I'm not all that confident, but I'm feeling risky. I feel that something's coming out.
70	I'm going to stay on, because I just don't trust it all that much.
71	I think something's going to come out in a second.
72	Why didn't I go with my instincts and up the bet for that one shot. Come on.
73	I'll play with 7, a round figure.
76	Come on eggs.
77	How much is left? (puts in coins). This might adjust the machine a bit.
80	I think if I don't win soon...when am I going to win.
82	Hey...a 100 on that shot. Two-sixty eight! Look at that! That's not bad. I'll put that aside. I'll just play with this. But what happens? This will be gone and then I'll start dipping into that unless I can discipline myself and get off the machine.
84	Nothing happening.
91	I have a feeling something might be coming out.
100	I'll take out 5 and keep it in parcels of 5.
101	Maybe I should quit now while the going's good. I always think that. If I don't listen to myself I lose my money. Most of the time I don't listen to myself. I just lose it. It all goes back.
106	I think I should go down to 5-no 4 lines- but seeing that egg makes me jump up to 9.
108	Is anything going to happen or not. Is it going to come along or not? I have a feeling that it might.

110	14 and I only got 4!
115	If I play 9 lines enough times I might get something.
120	Don't feel real good. I felt down because I just lost confidence. But I think if I dare it, I might get something.
121	Maybe I should try another machine. But I won't because I like this one too much. Usually, I got stuck on the same machine until it pays something or I lose all my money.
125	Time to start praying.
137	Hopefully the machine's got a fault and it pays when it shouldn't.
139	Maybe that's the only way to win sometimes-if the machine's got a fault.
141	I'm starting to feel that something's going to happen.
146	Now I'm feeling a little more reluctant playing this machine, but I love the game too much.
155	Na- nothing happened. Maybe it's the calm before the storm.
157	I feel lousy, but I feel daring I suppose. I want to get my revenge and get my money back.
160	I think I'll play 3 lines and wait for something to come out.
166	Nothing's happening.
173	I'll play 7 on the 1st shot-stuff it (goes back to 3)
178	Rubbish. Nothing's happening. Just get little wins.
194	Take out my coins. Do Something. It seems to help.
195	If I put 3 in at least I can keep and eye on how many are in there.
198	Because I got a few credits I suppose that's not too bad.
201	Ok 3 of those-if only-keep me going for a while.
205	If only I'd played 7 lines, I would have...
211	I'm expecting a surprise.
215	I don't feel all that confident, but I sort of feel that something will happen.
217	Something will happen.
218	Maybe I should just play 1 line-at least I might give myself a chance to win the free games or something.
223	I should have kept my money. I knew I should have. I was mad.
224	I'll be kicking myself for that a long time now.

Subject 2

Trial	Statement
3	I'm not very confident because only the scatters have paid.
14	It's the maximum scatters that have paid.
25	They're all coming out, but they are not spreading together.
28	I don't think it's going to pay.
31	So far the only thing which has paid is the scatters.
33	See, that's the lowest you can get.
35	No, I don't think it's going to pay.
40	I don't think it's going to pay fullstop.
42	So far, all it's paid is the scatters.
44	See that's the first time it's matched up with anything, other than the scatters.
46	Now, I've got 4 of these and the scatters.
47	See that's the first time they've matched up with anything that's paid.
48	There's the 3 scatters.
49	So, it's not paying without the scatters in it.
57	Nothing's coming out without matching up with the scatters.
63	If it wasn't for the scatters, it wouldn't be paying anything.
69	It hasn't paid anything except for the scatters.
77	Not going to pay at all, I don't reckon.
82	The only thing that's really paid out is the scatters.

88	See the scatters again. Without the scatters, you would have got nothing.
89	See the scatters again.
96	The only thing it's paid on is the scatters.
100	The only thing it's paid on is the scatters. Nothing has come on its own. Like the queens.
108	See it paid out again- but only on the scatters, not on its own.
111	To win, you have to get all those in a row.
115	No, it's only the scatters that are paying.
123	See, it's the scatters again that are making it pay.
126	Nothing's sticking together. Without the scatters, nothing.
129	That's the only thing that's paid-the scatters.
140	You can see that without the scatters you would get nothing.
147	Nothing else is coming together.
153	It's not going to pay. The only thing it's paid on is the scatters.
157	The only thing it's paid on is the scatters.

Subject 3

Trial	Statement
9	(near miss) See it dropped, the kings didn't.
16	'Didn't give me much did it.
19	Three little birds please.
22	Come on, it's got to come out soon.
25	See, you hardly ever get it from the other side.
27	I'm just about to kick this machine.
43	(drops coins in) It's empty-did they fill these machines up today?
67	This is not going to pay.
71	Where's the other 9?
76	Where was the other one? I think it was just below. I would have got the free spins if it had stayed there.
80	See, if I'd the one on the first line, I would have had the other one as well.
84	You would have thought it would have got another free spin by now.
88	I think I feel this thing's going to pay out though.
89	See, if there was another one there...
91	That is the worst run I've had for a long while.
92	There now, I've got one.
105	I wonder if the different ways make any difference. There's the other one. Look.
107	I didn't get over 100 for the free spins!
111	Boring!
114	Where's the other ones?
121	You hardly ever get them from that side.
122	Big deal!
131	Whoopie!
132	If I got another one, I would have got a free spin.
134	Let's see what you can do this time. I might be looking to get 20 out of this.
137	If I'd got a bell there I would have got a hundred.
139	Where was the other king, where was it?
144	Look at that!
146	Look at those, 75 points, that would have been all right'.

Subject 4

Trial	Statement
1	This one's empty too.
4	He substitutes.
8	This is empty as shit.
14	Yes, he substitutes.
20	If there has been another one, I would have got 200.
22	Look at that. If you get 5 of them, you get 3000.
27	I got it for...3 of them.
29	At least you get 2 for something.
46	You get 10,000 for 5 of them.
55	I haven't had a queen for a while.
62	Hey, I got another one!
68	I would like to get 10,000!
84	Ah look at that! (near miss)
100	See, this one doesn't pay from the end!
148	Look at this!
164	Three 7s, what do I get for that?
169	Get something for that don't you?
183	Get a lot more plays on 5 lines.
205	If I'd had another one of those, I would have had 250.
218	Look, if I got 3 of them.
236	Listen to that. This thing has filled itself up. It's full now.
246	4 of them and I would have got 1600.

Subject 5

Trial	Statement
8	This is going to come good in a minute.
76	It's gone right off.
127	This one feels better.
134	Doesn't pay our any better. Just feels better.
150	I just feel more confident on this one-that this one is going to pay out. I don't know why. I suppose it could be hope.
174	You think it's going to pay out, but it doesn't always.
199	It's frustrating when you see em all go by.
219	I think it's one of those where the next person will win.
243	You can tell when you're going out. It's downhill fast.

Subject 6

Trial	Statement
3	I like this machine. That's how I like to start and it is also how I keep myself going when I get something like that. I get 100 credits or more and I put it back into the machine what I had to start with. That way I can keep track of whether I'm winning or losing.
7	I rarely play 9 lines, but sometimes I look at it and say gee, I wish I had hit the 7 button- but I also figure that that's a faster way of losing money.
11	That's a little one.
13	I sometimes think they should pay out poker hands. I mean 3 jacks and 2 kings- Imean that's full house.
16	Gee look at that. If one more had lined up...
20	It's starting to look like what they call a one hit wonder-a bit dry.

22	It's taking more than it's giving.
23	There, 3 kings.
26	Not too many of those black rhinos turning up.
32	In fact, it's my belief that this machine is dead. I should go elsewhere. I'm not going to win on this one.
35	It's amazing how often they start off with a little prize.
42	Not much happening at all.
45	Why can't more sheep turn up.
51	Almost, but not quite.
62	I keep getting 5 bags, but I can't get then in a line.
67	Not looking encouraging.
82	I guess, if you consider how long I've been here, I haven't done too badly, a couple of dollars-but there's no money coming out. So I don't like it.
86	I guess I'm a hit and win gambler. If it pays out, I stick with it, if it's not giving me anything like now, I don't play anymore. I play another one.
88	I don't like to put in any more than a couple of dollars into one machine if there's no result coming from it.
91	This one is also, as far as I'm concerned, dead as a dodo.
94	I don't like to stay in one place if I'm not getting any return from it.
100	Wow, I got 4 for all that.
111	Why does the screen dissolve?
123	It's not my lucky day.
132	What did I get there, is that all?

Subject 7

Trial	Statement
2	I want the canaries and I want to get the free wins.
4	That's a nice start.
5	Not much happening on the free games.
15	Little bits, little nibbles.
24	I'm looking at what's happening on the screen and I can't think of anything else to say.
27	I want the canaries again. It's greedy!
33	Now it's not talking. Oh yes it is!
44	Slowly taking it down isn't it.
54	Two bells.
62	Started off well, but now I'm going downhill at a rate of knots.
72	Little nibbles again.
78	Two bells.
92	Not very much happening.
99	Goodie free games.

Subject 8

Trial	Statement
1	I always put 7 coins in for luck.
2	That's a good one.
4	More of the fish and more of the crayfish.
6	That's another good one.
31	Another good one. Come on
58	That's a good one.
65	Come on. More like that.
79	Come on. Bring up a big one.

89	That's a good one. Five 9s.
97	Nearly!
104	Come on, you can do better than that.
130	That was a good one.
151	That was a good one.
220	Come on. More of those.
259	I'm losing my money.
260	Come on. This time.
282	That's better. Come on!
286	Good one about time!
289	Now I'm on a roll.
297	Good one!
310	Good one!
311	Why couldn't that one be up there!

Subject 9

Trial	Statement
2	Those substitute and those are the scatters.
9	If that had been down there, it would have been three of them.
10	If that had only been at the other end.
16	This one's a bit hungry I think.
21	Don't seem to be very lucky today.
23	This is when you don't know whether to stay or to move to another machine.
28	That substitutes for everything.
30	I don't want to stay here. This is dead.
38	You need to get 5 of them in a row.
39	Nearly
40	Ah, nearly again, if that had been up there...
43	It's giving me little tiny bits.
49	If that had been down there, I would have got myself some treasure.
56	I got the 3 scatters.
66	I don't understand..oh yes there are the scatters.
72	You're giving me lots of little spits and little spits aren't you.
81	Yes..no just missed it.
82	Yes, yes, that's it.
92	Didn't stay up on the line, didn't drop down did they...
98	I got it there.
110	It was all over the place that time.
116	I'm going to try 3 lines now with 27.
125	Let's try 9 lines.
130	There's the sheep.
131	I needed that up and that down.
136	Oh yes, nearly.
139	You really get a good pay out when you get the right order.
151	Apart from the bonus feature, I really haven't made much at all.
154	I missed that!
162	Three 9s, this time, this time...

Subject 10

Trial	Statement
2	I won 10!
5	I think I've got a machine that doesn't do anything.
8	Not very good.
9	That's a start.
11	Four of those things there.
12	I'm down to 80!
15	Not getting the butterflies.
18	Not doing very well with the first 5 dollars.
19	There's one.
20	Now I've got a win-25.
22	Needed another frog.
27	Not very many coming out in this game.
29	I always seem to be one off everything.
30	No nothing.
32	Needed another one of those there.
34	Ah.I got 4 of them, 50 credits back again.
36	Three 10s, 5 credits.
40	I've only had 3 invitations.
41	The butterflies are not coming out. Those 2 should have dropped down there.
44	haven't had very many wins yet.
47	Now I'm going to pay 4 lines.
48	I'm going to pay 5 more and see how I go.
49	I think this machine is not going to give anything very good.
51	Nothing in a long time, without even a credit.
54	Nothing.
57	Should have turned it off-it's rigged-hopeless.
60	I think I had 60 credits at one stage and that was it.
61	I think I've picked a grumbly machine.
64	Three? Why can't I have four of those things...at least get 100 credits.
68	Absolutely nothing.
70	Ten dollars and nothing!
71	Three- I need another one up there!
72	Come on give me one-yes now I've got one! That's the first time I've got one of those!
74	I thought the machine wasn't very kind to me.
76	I needed another one.
79	They give you one payment and then they go quiet on you for a while.
81	Another 2 in- 6 left.
83	That would have been nice, if that had been left.
84	Of...2 of them!
85	3 kings. What's the top one-6000- that wouldn't come up very often!
87	Three of them. Oh...if there had been another one up there. This machine is funny.
90	Oh...he could have gone down one.
91	The butterflies are in the wrong spots.
93	No only two.
94	It could have gone down there.
96	That's a better one. That's the best one I've had so far. Four little things.
98	Three!
100	Maybe it's going to warm up, maybe it's going to go quiet.
101	Ohh 3, I like the colours on this screen.
106	Oh...nearly there.
107	I don't think you get 200 very often.

110	Oh...another one wanted there.
112	I like those little green frogs. They're funny.
113	Nope. No more butterflies.
116	I think you get one win and then it dies.
118	Oh I needed another one- a fourth one.
119	Four butterflies, 250, that would be a good one.
122	Nope I think it's had it.
125	Come on do something else- not just 2s.
127	Come on- look at that one up there!
128	Long time between drinks.
130	About 20 pushes without a credit.
134	Four fairies. That was a long time coming. I only got 55 for that.
137	Three kings.
138	I needed the fourth one.
139	Three again.
142	It's gone quiet.
144	One payment, and it just dies- always one off!
146	Look at all those pretty butterflies. Three butterflies and only 10!
147	I don't think you get 5 of anything very often.
150	Three!
151	You can't even get 5.
154	Take em out and put em in again (coins).
158	Three.
161	One two three, can't get four of anything!
162	Look at that (near miss).
164	I don't think I'm going to make a profit on this machine.
168	Always one off.
171	Look at that!
172	I think I picked the wrong machine.
177	Look at that-three-17!
178	I suppose you have to bet big to win big.
181	No, it's going to go completely down.
184	Nothing.
188	Nothing.
189	No I'm not doing anything on this machine.
190	Three again.
192	The most you get is 10 credits.
193	It's gone up to 15.
200	Hopeless.
217	No nothing.
218	I'm down to my last 2 coins.

Subject 11

Trial	Statement
1	That was lucky
2	Oh Oh way to go. Told you. This machine is it.
6	Need three of those or the tigers.
7	I love this machine. This is the one I won big on at the Crown.
8	That's the substitute.
11	Can I have one more king?
15	The lion is the substitute. Get all three and I win.
17	There you go. This is excellent.
18	Way to go. This machine does it for me every time.

22	Now that it's winning, it will keep on winning.
23	It's got to keep winning.
24	Three of those. They substitute for those.
25	Three of those. That would have been ideal.
28	One more of those and one more of those over here.
31	See it's coming out. It's coming up.
32	There-one more.
33	One more tiger, one more nine.
36	He substitutes for everything.
37	He could have been across there to give 3 panthers.
38	My money's running out. One more down and I would have been OK.
41	Look at that (near miss)
43	One more. He could be up.
44	This is going to win now because it's had a stop.
45	Your mother's a microwave.
47	Five tigers. Knew they were coming up.
52	Come on machine.
53	Two more down.
56	All I need is the scatters. That would be ideal. Come on scatters.
58	Look at them all (near miss).
59	Look at that (near miss).
62	Look at that (near miss).
63	Look at that (near miss).
64	Look at that. It just had to be up there and I would have had four of them.
65	Oh look at them. It's just not going to come up is it.
67	Look at that (near miss).
68	I'm not doing very well.
73	Look at that (near miss).
74	I would have sworn this machine was lucky.
76	Look (near miss).
77	I told you.
78	Come on. Keep winning. You could do it again.
81	Look
84	Fast going downhill.
86	I tell you. This machine is going to pay.
89	One more there (near miss).
91	There you go.
93	Oh look. 2 tigers here.
100	No tigers, but tigers coming up.
103	Your mother's a microwave. See I told you.
105	Now, I'm going to get 5 of them. It gives you 3 then 4 then 5.
106	Look at that (near miss).
111	Look at that (near miss).
115	I'm losing my money now.
121	I've got 120 credits. I want 1000.
122	I'm only betting 5.
127	Your mother's a microwave.
130	I think it's had it. No it hasn't.
138	Come on machine.
141	I need another huge win.
143	I just need 5 of those or even 4.
150	What did I say. He only needed to be up there.
151	Look (near miss).
156	Come on machine. Do or die.

158	Look one more jack there. That's twice it's done that.
161	Just think if it had a huge win. It sings and dances for joy.
165	Look at that (near miss).
166	It will win now.

Subject 12

Trial	Statement
1	That's a good start.
3	This is the one.
5	I'll start insulting it. See I scared it.
7	Look at that. Well done. That should have been up there.
9	How's that. I charmed it.
12	Ah. Look at that. That one there- another one.
16	Come on machine.
17	I want the scatters.
18	Alright I'm going to start insulting you.
20	Oh yes, but that one should have been down there.
22	Yes, but that one could have been up.
23	Come on. Win.
24	Oh Look at that (near miss).
26	Ah...come on.
31	I need 4 of yous. I could have done with one more up there.
32	Come on. Don't be shy.
36	Come on. Don't be scared.
37	Come on. These things keep coming up.
39	Come on. Lucky touch. Touch the rhino.
43	As long as it keeps paying.
46	I have to get 5 soon. Come on machine.
48	No Not bad.
51	OK try double click.
53	OK. I'll touch the rhinos 3 times. so three rhinos come up.
56	Hey look at that. That was pretty close.
58	They all sort of come up, but not in the right order.
60	Hmm nearly (near miss)
61	I needed one more (near miss)
66	I needed one more (near miss)
68	Ah another jack (near miss)
70	Come on scatters.
72	Come on. I'm running out of money. Hurry up.
73	This one could have been down (near miss).
76	I just needed one more. Getting close (near miss).
80	Even 5 of those- a 100 would be all right.
83	Come on. That's so close.
85	Don't know how many times they've come up and the extra one hasn't. It's mad.
90	Now, we have to win machine.
91	Here we go. That other one did not turn over (near miss).
97	Hey look at that, hey (near miss).
102	I just want a couple of those as scatters.
104	Come on now and you better win.
105	Come on now. Win. Oh you are an awfully greedy machine. Very hungry.
111	I'm going to swap machines on you- I will go to your partner next door.
113	Come on. I'll have some more of those.

116	I'll get ya!
122	Come on. Win.
126	When it comes in the first 2 reels, you expect at least another couple.
127	I'm getting awfully angry.
129	I needed just one more.
134	Come on. Be good.
137	You think another one would come up.
138	I want to kick and swear at this machine.
141	Look they are gonna come up.
145	Come on. Win. Pay up. I just need 4 because they pay up 180.
146	Come on. Just 4 of yous.
149	Look at that. Excellent.
154	Not bad. I just want 4 scatters.
157	Come on. Win.
158	Come on machine! This is you last chance.
159	Come on machine. Don't let me lose my money.

Subject 13

Trial	Statement
1	Not much good.
4	This is a load of old rubbish.
5	They're coming around, they've gone again.
8	I'm filling it up for some-one else.
10	I haven't had one drop yet.
13	Last dollar in here I'm afraid. Thank you.
18	Lots of men fishing please.
19	Not happening here. Not getting the bonus feature thing.
27	Not paying out at all.
28	Isn't it strange.
29	Ah here he comes (fisherman symbol).
31	Nothing.
37	Nearly. Nearly. Got the kings. (near miss).
47	I don't like this machine.
48	I want a row of my look-alikes. Marilyn Monroes.
52	It's empty. Doesn't sound particularly profitable.
66	Why wasn't that up there (near miss).
69	That's better.
70	You don't get the Oscars up very often.
78	Hooray.
79	Maybe they're coming around now.
85	Don't often get 2 stars together do you?
87	Don't stop there.
98	Not much today. It makes it look like you've got a lot, but it's not much really.
101	Just little bits enough, to keep you going.
112	Look at those birdies.
117	What I want is three eggs together.
120	Step in the right direction.
122	Those cats don't come up much.
133	God, nearly (near miss).

Subject 14

Trial	Statement
1	Thank you.
4	Yes, not bad.
5	Thank you.
21	One more.
25	This is where I usually kick the machine.
31	They're coming.
34	Not bad.
57	I can't say very much. I become very mesmerised by the game.
62	Thank you.
71	Thank you.
73	Little wins.
79	Come on bags. Where are you?
86	Look at that- one down (near miss).
88	What was that-OK-2 of those- queens.
95	They just won't line up. How frustrating.
100	Going down.
103	Come on machine. Pay something.
105	Little bits.
116	That's a bit better. Thank you.
117	It's warming up.
121	That's a strange win-9.
132	It's beginning to warm up now.
136	Oh look. Why don't you line up!

Subject 15

Trial	Statement
1	Might be in a reasonable mood.
4	It's been lucky occasionally.
7	It doesn't look like there's many coming up on this machine. Of, there we go. Free games. Good, as long as it pays you something, you'll probably win 30-40 credits. I would like to win something one day. There's a bit. I wish I would get 5 Oscars. There you go. I've increased my money by about 3 dollars.
8	Generally what happens is that when it's done that, they don't tend to come back for a while. So, I usually drop down a few lines and see what happens, usually...I reckon that's the way it goes. If you watch the machine and you see there's nothing coming up on those lines. But you miss it occasionally but it's not worth worrying about though.
11	That's all right, it's come up on one line. 20 credits that's not too bad. This machine might be in a good mood.
14	I'll play a few more one line and then go back up.
17	What I want is for the Oscars to come up. Oh, there's two. This machine is not behaving too badly at the moment. But they all tend to do that and then they take your money away.
21	Almost tempted to go up. But that's probably how they suck you in actually.
24	Come on. More stars would have been good there. I got one in the third spot.
30	I'm tempted to go up to see what happens. Usually when that happens, it tends to take your money away I reckon.
35	I like it when you win less that you are betting. I think that is ridiculous.
38	I think it's doing what it usually does. It gives you a bit of a win and then it starts to take it away.
41	If I stay on this one, I'm probably going to lose my money, I reckon.

43	I've almost given back everything I've won.
45	I think that's a silly thing to do myself.
47	There's not a lot happening on this machine. It gives you a free game every once and a while.
50	It's only paying rubbish.
54	I didn't notice those Oscars there.
55	This is better, This is the sort of thing you want.
55-60	This machine must be in a good mood. So what I normally do then is go down because I do not believe that it will sustain itself. In fact, I am almost tempted to probably get off it. I think that's what they tend to do. They give you a little but then if you stay on them, they tend to take it away from you again. All of the Oscars have disappeared.
67	Yep. That's what I think they do. They give you a bit..well...there's a little bit.
72	Where's those Oscars, that's what we want.
74	This machine is not doing too badly for a change.
77	I'll try 5 lines. See if the Oscars will come up. They haven't come up for a while.
80	There's a little bit.
85	I think it's slowly taking it away.
89	I think I'll try three lines to start.
92	There's a bit of a spit. That's good.
93	After you get a good spit, it's good to go down for a few presses.
99	There's not a lot of butterflies on this one.
101	I'll go back to 3 lines.
103	I'm starting to be disappointed with this machine.
104	That's better.
106	That's a better one. I tend to be a bit conservative. I tend to think that these thing pay off for a while and then they tend to take it away.
110	There does not look like there's much coming up on them. But sometimes you miss and you wish that you had bet on a few more lines.
114	I'm disappointed with that. They've come up and I should have won a lot more money.
125	I've got a theory about these things. The more credits you play, the less likely the scatters are to come up.
130	Only 2 nines. That's pretty disappointing after so many spins without a win.
131	That's a lot better. I got my money back.
133	Needed another scatter (near miss)
136	Missed the 3 (near miss)
140	I think this machine is starting to rip me off now.
143	No nothing's coming up whatsoever.
147	It hasn't done anything for a number of presses. That's a bit lousy when you only get 5 back after have lost 30 or 40 credits.
150	I don't think it's going to pay any more now.
152	Maybe the scatters might come up. It's worth taking the chance.
155	That's better. I liked that one. I had a feeling that it might come up. I don't think it will pay again for a while. It will start to take it away.
156	I was hoping that giving it a little bit of a kick would bring up the scatters where it did.
164	I wish I could have had a few more butterflies on one line. That would have been nice.
166	That's all right too.
167	It took a chance because I thought they might come up, and they did.
171	This machine isn't paying out too badly at all.
180	Looks like some-one else has been playing 5 lines. I normally don't like to play the same amount as some-one else has been playing, not at the start anyway.
181	I think it might tend to...if some-one has played a lot of credits, I think it might come out at the bottom end of the scale.
184	I'll try 5 now.
186	I'd like to get all the sunshine up on this machine one day. I've never seen it happen.
187	It always seems to come up in the wrong spot.

191	I like the way you only get 2 coke bottles.
193	Sometimes the machine goes into long periods without paying anything.
194	It's coming up in the wrong spot.
195	It might reset itself and come good.
196	The machine's just toying with me.
197	Yes, that's pretty disgusting (near miss).
198	Some-one might have had a payout out of this one. It doesn't look like it's doing anything.
203	This one's been particularly lousy, I think.
206	It's not giving a thing.

Subject 16

Trial	Statement
1	I'll try 3 to start-oh that's nice.
3	I'll try that and see what it does. Often, I see people playing this machine when I'm not playing it and it sings at them.
6	That's nice.
8	I'll try 5 and see if I can get some scatters up.
10	The screens on these machines seem much clearer to me. It's the reason why I play them.
18	I'm going to play a bit faster.
23	Not much is happening for me. I might have to move machines.
24	That's a bit better.
26	Doesn't even give you back what you put in.
28	It's not very exciting when they don't give you anything over a number of presses.
31	If I run out of money on this, I'll have to change.
32	See, I should have been down there (near miss).
35	I don't like the way this machine is playing.
39	It's not singing at all.
45	I'm glad I'm not playing 4 lines. I don't think anything's come up on the other lines.
49	I'll try this one and see if it pays out.
50	A bit better.
52	It should have been on that line (near miss).
54	When you play carefully, it comes up on the other line. I suppose if I do that [ie. bet 5] it won't come up.
57	A whole 4!
61	I have a feeling I'm not going to win anything today.
62	That's something. All I need is a bit of a song.
67	Goodness me. I'm not doing very well at all.
68	Look at those fish and none of them mine.
74	Come on, where are all the scatters...oh there they are.
76	No lucky baskets. I think I'll have to move again in a minute.
80	I don't trust this machine. I don't usually play it. I thought I was going to get some golden eggs.
82	Two bells.
83	I've lost confidence. Oh yes, this one pays from both ends.
85	I'll try 5 and maybe the free games will come up. There's a cat that didn't pay.
87	A whole 4!
88	There should have been another canary down there.
92	I've got this awful feeling that nothing's going to come up. I think it's decided that my luck is gone.
94	A mean machine.
95	Ladies everywhere.
97	What I need to see is a row of something come up.

105	I'm gonna have to have a big burst of luck somewhere.
106	I'll pluck up see what happens.
107	I got the cat.
108	Two bells.
111	This will be to show how nasty machines can be.
116	I have a feeling that nothing's going to come up. Only little things.
117	Those carets don't look like they want to come up.
119	This machine looks like it's paid after it's got there.
126	I'll play 3 lines. Be brave. I don't know what those symbols mean.
128	Of yes, one queen, win two.
131	There they are. Oh...there are the substitutes.
133	We need plenty of clovers then please.
136	What's that 5 or 4, Oh...it doesn't pay from that end.
140	I'm not doing very well at all.
141	Two threes and a four.
142	Looks like the credits are going down very rapidly.
147	It's horrible, isn't it. Everyone I've picked won't give me anything.
149	Win 2-whoopie.
153	I've done my dash and got nothing.

Subject 17

Trial	Statement
1	I'm going to try 9 lines to start with.
4	Give it another go.
6	Still worth a go.
7	Might be a big one. Keep playing 9s. Now I collect it and usually what I do is put 60 back in again. If I didn't get a layout on this. I change machines.
13	Oh dear. Look at that (near miss).
16	What have we got here-little bits. I'll collect it. Might trick the machine. Might pay out another big one.
21	I'll give that one a miss now. I've drained it.
23	Now, I'll play 9 lines.
35	If I don't get something in the next couple of dollars, I'm going to give it up.
36	It's got a feature thing on it. If that hasn't come up by the time I've spent the next couple of dollars, I change over.
40	Oh yes. This is what you look for. This is what makes it worthwhile playing. If you get this you are right. If not, you're not.
41	I usually put another 3 in. This one's doin' all right so far.
50	Worth another go.
62	Starting to slow up a bit.
65	Starting to pay well.
70	Looking for 5 bags in a row.
75	One more dollar.
80	Change of luck-go back to 9.
89	Well..gamble another dollar. Got to pay out soon.
91	There is it!
92	Put one back up.
96	Now, I'll change. Not playing that one.
97	We start off with the usual 60 credits.
100	There's a good win.
120	Now we're going to double up.

131	Not feeling very lucky now. Think I'll go back to 5.
146	Worth 2 more dollars.
151	Nice one. Nice to see 5 of them in a row: 10,000 credits.
164	Let's hope the luck continues.
184	Get 5 of them and you will be all right.
198	I think we've run out of luck. At this point, I'll think I'll change.
200	I'll go for 5 lines.
206	I'll go for 8 lines now.
207	Increases the odds a little bit. That's 3 bells.
211	Stick with 8. If you lose, you lose more, but if you win, you win big. Keep going at 8, see if I can get a big one. Can I bet 9?
213	There's 3 bells-15. If you get the bells on this one you get a really good bonus.
215	Nothing
216	Nothing.
218	Oh watermelons-25.
220	Only one.
221	Wow..3!
223	Wow ..3!
224	Got 20 there.
227	Going down a bit.
229	Starting to sing a bit.
231	Won 8.
232	Won 11

Subject 18

Trial	Statement
1	I'm just looking to see what comes up.
7	I'm looking to see what comes up.
8	I play a different machine each time. I don't play the same machine all the time.
11	I usually like to move around if nothing's coming up.
22	Not much happening.
24	It's got to have money in it to pay out.
30	Not much happening.
34	Nothing's happening on this one.
37	I don't like the sound of some of them. They all play a different tune.
41	No it's mucking around. Playing low. I'm not really into big bets.
45	This machine doesn't pay much.
47	That's a better one-15.
51	I'll try 5.
54	No stick with 3. I'll try 2 because it's low.
65	Not much luck.
71	Not much happening.
73	Often start with 3.
76	I think it's rigged. But some people push them and it just clicks over.
83	These machines are different. They just take money.
92	Pretty disappointing.
100	No there's nothing happening on any machines. I don't like playing them when there's nothing happening.
110	No not much.
112	I get anxious playing these. You have to check that people haven't left it on 45.
114	I'll try 7 again. Seven might be lucky.
122	Once they're paid something like that, they don't usually pay any more. It had paid 200

	out before and that's 500.
142	I'll stick with 5.
150	I haven't played this one before.
154	Not much happening on this one.
155	I'll give it another go.
170	Nothing on this one.
175	It's tricky like that. You see that. You could have easily pushed it when it was still paying.
182	Sometimes they don't want to pay out and all of a sudden they pay out.
184	Usually when they pay out, you think they will not pay out any more.
197	Didn't work on this one. Sometimes when you push another button. So you try another button. You almost feel that the machine can tell.
203	No nothing happening. Try another one.
204	See what happened after it's paid out.
208	Give it another go and see what happens.
218	I'll try 7.
226	I'll put another dollar in and play a bigger number.
233	Don't like this one.

Subject 19

Trial	Statement
7	It's not being very typical at the moment.
12	Nothing at the moment.
14	There you go. Every time I say no, I'm wrong.
16	Yes, good one. This is a good machine.
17	Can't tell you about this one. It seems to pay out every third or fourth one.
23	Nothing at the moment. Nothing.
24	Throwing money down the toilet.
26	Had its run..oh no...here it goes.
29	I don't know when it's going to do something. I really don't have a clue.
30	The zebras are coming up. That's unusual. They usually don't come up at all or very rarely.
40	I'm not playing one at a time. It drives me crazy.
51	It's a rotten machine.
54	Zilch.
56	Big deal.
61	That jigged it up, didn't it (increased bet).
65	Come on Jackie, stop pulling teeth.
66	I get really impatient. I do. I don't know how people can play one on it. It drives me mad.
68	That's better. And again. Big one this time.
70	If that had been up there and that one had been down there. 5 of those-very nice.
71	It's a terrible machine.
73	Bit better.
77	You always feel more hopeful when you get a black rhino to start with.
81	Look at that. What a waste.
85	It's not a good machine. It just paid out, I think.
86	Be a nice machine. Keep us going a bit longer.
90	This is my mother-playing 5- drives me insane.
93	Still nothing. Disappointed.
101	Nothing. Shocking machine.
107	Nothing.
108	Starting to pay out a bit more now.
113	That's better.

121	This is like pulling teeth.
127	Nothing.
128	Still nothing.
132	Still nothing.
152	I could put this on autoplay.
155	That looked really hopeful.
165	What a shame.
174	When I put money in, it was empty-the money dropped to the bottom-which is not a good sign is you hope to get any money out of it.
178	Come on jack. Just one would be nice.

Subject 20

Trial	Statement
4	Look at that. I jut missed.
6	Shit! Look at that. That sun just dropped and would have given me my hundred. Sometimes, you know, the bottles drop and it stops you from getting things.
10	These are very hard to get. The kings. Five kings.
11	Look at this. Another sun and there would have been 5 in a row.
14	I'll try 9 on 1. Change my bet.
19	See it stopped me from getting it.
21	The bottle dropped again on me.
23	Money goes down quick when you lose, you know.
36	That's not bad. But if I'd been betting 10, it would have been doubled.
41	I love it when you get 5 of them.
48	That's 40.
55	I've been waiting for the 3 bottles to come up.
60	See that drop.
63	Look at these, 2 suns there and I would have got 5 of those (near miss).
75	It only paid 50 when you're betting 5.
76	It's good when you see the suns.
81	I'll tell you what: that bottle drops a lot down the bottom there. Stops you heaps of times.
86	It would have been good if they all had come up. Look at that. If I'd had another chilli.
103	Look at that! Another sun and I would have had 5 kings.
105	I got the chillis. Thank you. Thank you.
120	Look at that. Why did you have to be there. 5 of them would be beautiful: 2000 credits!
127	See, how the bottle drops there all the time.
133	Another chill there and I would have got another one. If that bottle hadn't been there I would have got those too.
136	There it is again.
138	I'll try 9 now.
141	Ah 3 kings.
152	See it stopped me.
164	Look at that (near miss).
169	That bottle again.
171	There it is again.
175	If I'd had one more there.
178	Another one there and I would have got the 2000. I'm only betting 5.
180	Some-one should look at that bottle. That's why I reckon it's rigged-the bottle keeps dropping there all the time.
183	See (another bottle).
197	That makes me wild, it does (another bottle).
244	You bastard, you dropped down.
269	Look at that (near miss).

304	Look at that (near miss).
306	Come on. Look at that (near miss).