THE TYPE A CORONARY-PRONE BEHAVIOUR PATTERN, SELF-AWARENESS AND STANDARDS FOR PERFORMANCE

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TABLE OF CONTENTS

CHAPTER 2. (continued)

CHAPTER 3.

CHAPTER 3. (continued)

CHAPTER 5. (continued)

CHAPTER 6.

CHAPTER 6. (continued)

CHAPTER 7.

CHAPTER 8.

CHAPTER 8. (continued)

CHAPTER 9.

CHAPTER 10.

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

SUMMARY:

The research program reported in this thesis was carried out to investigate the possibility of a relationship between the Type A coronary-prone behaviour pattern and self-awareness. From a review of previous work in this area it appeared that Type A coronary-prone individuals tended to resist self-awareness in demanding situations, whereas this did not appear to be the case for non-coronary-prone (Type B) individuals.

Two surveys which sought to investigate the possibility of a relationship between the dimensions of Type A behaviour and dispositional self-awareness were carried out. Data from these studies indicated that there was a small but consistent positive relationship between these dimensions. These results were taken as evidence that any relationship between these two dimensions may be, in part, situationally determined with Type A individuals actually being more self-aware than their Type B counterparts when unchallenged.

A series of 5 laboratory experiments were then carried out. These experiments employed manipulations designed to enhance the level of self-awareness of Type A and B individuals who were engaged in a challenging cognitive task. Data from the first of these experiments indicated that Type A subjects tended to resist becoming self-aware but only when they believed that their previous performance had been poor. This result was in

line with a hypothesis, developed from a review of the literature concerning self-awareness, that Type A subjects would find awareness of previous poor performance particularly aversive due to their very high performance standards. This first experiment also indicated the possibility that greatly differing performance standards become salient to Type A and B individuals when their level of self-awareness is enhanced.

In the light of the results of the first experiment the emphasis of this research changed, in that subsequent experiments attempted to clarify the nature of the performance standards held by Type A and B individuals in differing social situations. In two of these experiments performance data and subjects' attributions about factors affecting their performance were collected. Data from these experiments supported the notion that Type A and Type B subjects possess differing standards for their performance, both when they are alone and in social situations. These data also indicated, in line with the findings of other researchers, that Type A individuals have high standards for their own performance and are interested in maintaining control.

Evidence was found in the performance data from these experiments to suggest that Type A individuals become more concerned with the accuracy of their performance in social situations than when they are alone. Generally the data from Type B subjects tended to show

that these individuals are less responsive to their social situation than their Type A counterparts. It also appeared likely that Type B individuals hold less well defined standards for their own performance than Type A individuals.

The relevance of these findings, to both research into the modification of Type A behaviour, and to research concerning the nature of Type A and B behaviours is discussed.

DECLARATION

This thesis contains no material which has been accepted for any other degree or diploma in any University, and to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made in the text.

Signed_

R.M. Herbertt

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CHAPTER ONE

1.1 Introduction

This chapter is intended to supply the reader with an overview of the structure of this thesis by providing information about the location of material presented in this work and the chronological order in which the research reported here was carried out. The chronology of this research is important as it elucidates aspects of the structure of this work which were determined by the research data and theorizing available at the time that various experiments were designed and carried out. Information about structure is also necessary as various data are reported as though coming from different studies when in fact they came from the same, or over-lapping, groups of subjects taking part in different parts of the same study.

Although reviews of the main body of relevant research literature are presented at the beginning of this thesis (before any experimental data are reported), shorter reviews of pertinent literature are presented, where relevant, in chapters which report research data. Information about the locations of these brief reviews will also be supplied in this chapter.

1.2 Chronology of Reseach

The Type A pattern of behaviour is described in some detail in chapter 2 (section 2). Evidence for the status as a risk factor for the development of Coronary Heart Disease, of Type A behaviour as opposed to non-

Type A (or Type B) behaviour, is reviewed in chapter 2 (section 3). From the literature concerning psychological aspects of Type A behaviour (reviewed in chapter 3), it appeared that a relationship between this pattern of behaviour and self-awareness may exist (these research data are reviewed in section 3.8). Given the obvious relevance of such a relationship to research into attempts to modify Type A behaviour, which were being suggested in the literature at that time (eg. Rosenman and Friedman, 1977), the author planned to investigate the extent and nature of this posited relationship. Investigation of this topic commenced with an experiment designed to induce self-awareness in Type A and B subjects performing on a demanding task. It was evident from this first experiment (carried out early in 1979 and reported here in chapter 6) that Type A and B subjects were differentially affected by a manipulation of self-awareness but that this relationship was mediated by feedback about their performance.

Following experiment 1, and in the light of the research literature available at the time, another experiment was carried out early in 1980. Experiment 2 (reported in chapter 7) was run using a group of subjects who had completed a package of Type A behavioural and self-awareness questionnaires the data from which are reported as the first survey study (chapter 4). Performance data from this experiment did not elucidate the previous findings but subjects' attributions concerning factors affecting their performance were collected during experiment 2. These attributions (reported in chapter 9) shed some light on the nature of standards which are salient to Type A subjects when they are forced to be self-aware. An experiment to investigate the effects of monetary incentive and self-awareness on Type A and B subjects was run late in 1980 using a small group of the subjects who had taken part in experiment 2. This experiment is reported briefly in appendix F because it is only indirectly relevant to the line of research reported in this thesis.

Another small experiment was carried out midway through 1981 to assess the effect of the process of making attributions during a performance task. Once again this experiment is reported in appendices (appendix E) as it is peripheral to the main line of research reported here. In late 1981 through to early in 1982 the author learned to administer and score the Structured Interview which is considered to be the best available method for assessment of Type A behaviour (the evidence for this contention is reviewed in chapter 2). A second questionnaire study was subsequently carried out (reported in chapter 5). A group of subjects who took part in this study were interviewed (using the structured interview) by the author (interview data are also reported in chapter 5) to select subjects for a third experiment (reported in chapter 8). Subjects' attributions were also collected and are reported in chapter 9. The chronological order of studies is diagrammed below (fig. 1).

Figure 1: Diagram illustrating the chronological order in which research reported in this thesis was carried out.

		Experiment 1 (ch. 6)	
1979			
	Survey 1 (ch. 4)	Experiment 2 (ch. 7)	Attributions (ch.9)
1980			
		Small Expt. (appendix F)	
		Small Expt. (appendix E)	
1981			
	Study trip to learn structured interview.		
1982	Survey 2 (ch. 5)	Experiment 3 (ch. 8)	Attributions (ch. 9)

1.3 Structure and Locations of Specific Information

An outline of the location of specific information and reviews is presented in this section to provide more detailed information than is available from the table of contents. Chapter 2 presents reviews of the research literature on the Type A coronary-prone behaviour pattern. This chapter is selective in that it reviews, in some detail, areas of the literature which are of particular relevance to this thesis. Areas which have little relevance to this work are dealt with more briefly. Chapter 3 reviews studies concerned with psychological aspects of the Type A pattern of behaviour. This chapter attempts to present a thorough review of the literature.

Chapters 4 through 9 present details of research carried out by the author. As can be seen from the previous section, these chapters do not present this research in chronological order but seek to structure it so as to maximize ease of understanding and to prevent repetition. Questionnaire investigations of the possibility of a relationship between the dimensions of Type A behaviour and dispositional self-awareness are reported in chapters 4 and 5. The literature concerning the scales employed to assess dispositional self-awareness is reviewed in the introduction to chapter 4 (section 1). Developments in this literature which occurred after the first questionnaire study was carried out are covered in the introduction to chapter 5 (section 1).

Experiments 1, 2 and 3 were all designed to manipulate the level of self-awareness of Type A and non-Type A subjects to determine the effect which this would have on their performance (in experiments 2 & 3 attributions were also collected). The literature concerning theories of self-awareness and the utility of differing methods for enhancing that state are reviewed in chapter 6. Developments in research and theorizing about self-awareness are reviewed in chapters 7 and 8. The influence which the chronology of the experiments and of developments in self-awareness theorizing had on the design of these experiments is made apparent in these chapters.

The main review of self-awareness theory is presented in the introduction to chapter 6 (section 1). This is mainly concerned with the theory of Objective Self-Awareness (eg. Duval and Wicklund, 1972; Wicklund, 1975; 1978) which was the most widely accepted theory to explain self-awareness effects at the time when experiment 1 was planned. Developments in this theorizing (eg. Wicklund, 1979; Carver; 1979) and relevant aspects of social facilitation theory (eg. Zajonc, 1965) are briefly reviewed in the introduction to chapter 7. Further developments in both of these areas and a theory to integrate aspects of self-awareness and social facilitation theories (eg. Carver and Scheier, 1981) are dealt with in some detail in the introduction to chapter 8 (section 1). Alternative approaches to explaining social facilitation and self-awareness phenomena (eg. Guerin and Innes, 1984) and the possible role of drive effects in this research are also discussed in chapter 8.

Due to the complexity of the performance data reported in chapters 7 and 8 the data from subjects attributions are mentioned only briefly in these chapters, being reported in full detail in chapter 9. An integrative discussion of the performance and attributions data is provided in chapter 9 (section 4) and continued in the conclusions chapter 10. Chapter 10 also attempts to integrate all findings from this series of studies and suggests possible ramifications of these findings, especially for those attempting to modify Type A behaviour.

CHAPTER TWO

2.1 Introduction

This chapter presents a brief review of the research literature concerning the Type A coronary-prone behaviour pattern. Research which is considered to be of tangential relevance to this thesis is dealt with briefly. Such research includes investigation of the posited physiological links between Type A behaviour and Coronary Heart Disease (CHD) and research into the aetiology of the Type A coronary-prone behaviour pattern. The existence of a link between the Type A pattern and CHD is, of course, the basis for any interest in the pattern, and hence consideration must be given to the work claiming to establish such a link. This includes work on the aetiology of the Type A pattern and work which seeks to identify possible mediating factors between this behaviour pattern and CHD. A detailed review of research into the psychological aspects of Type A behaviour pattern is presented in the next chapter.

Some mention of ongoing research into modification of Type A behaviour is made at the end in the conclusions to chapter 10. This is due to the fact that data from experiments reported in this thesis have some implications for those attempting such behaviour modification.

Type A behaviour has been widely accepted as a risk factor for the development of cardiovascular pathology (eg. Steptoe, 1981; Friedman, Thoresen and Gill, 1981). Most psychological researchers justify the investigation of Type A behaviour with reference to its status as a risk factor for CHD (eg. Glass, 1977a; Davidson and Cooper, 1980; Matthews; 1982), so data supporting this risk factor status are reviewed in detail in this chapter. As a possible risk factor for CHD, the pattern has attracted the attention of social and occupational psychologists concerned with work behaviour and work stress (eg. Matthews, 1982; Davidson and Cooper, 1980). As with many other areas of research into individual differences, however, research into the antecedents and concomitants of Type A behaviour also appears to be motivated by the desire to enhance the understanding and predictability of human behaviour. Part of this interest in Type A behaviour may be due to the fact that it is not strongly related to other personality dimensions (eg. Glass, 1977a; Jenkins, 1976). The next chapter will review the research which has been carried out into the relationship between the Type A behaviour pattern and various personality dimensions.

The other main area of investigation which is reviewed in the present chapter is research into the reliable and valid assessment of Type A behaviour. This is particularly relevant to this thesis as shortcomings in assessment techniques are suspected of complicating the interpretation of some of the experiments reported. Assessment is also discussed in chapter 5. The review presented in this chapter, however, deals with evidence to support the veracity of most widely used methods of assessment, with particular emphasis on the methods employed in the research reported in this thesis.

In order to deal efficiently with the body of research data concerning Type A behaviour, this review is divided into sections. An attempt has been made to present these sections in an order which minimizes the number of forward references required in each section. Due to the fact that some sections of the following review are interdependent, however, some forward references and repetitions are still necessary.

2.2 Description of Type A Behavioural Characteristics

The Type A coronary-prone pattern of behaviours was first tentatively identified and described by Friedman and Rosenman (1959; 1974). Friedman, Rosenman and Carroll (1958) might be credited with the original determination of the risk associated with this pattern of behaviour. They reported the opinion amongst a group of physicians and business executives that the excessive drive associated with competition and meeting deadlines was the chief cause of CHD amongst their colleagues. Friedman and Rosenman (1959) then went on to demonstrate that cyclic increases in work load were associated with increased cholesterol level in a group of accountants.

From their clinical experience these researchers (Friedman and Rosenman, 1960) described a constellation of behaviours which they believed to characterize a disproportionate number of CHD sufferers. These behavioural characteristics were competition, ambition, aggressiveness, impatience and a strong sense of time urgency. Friedman and Rosenman (1974) offered a more complete definition of Type A behaviour which is widely cited in the research literature. They described the Type A pattern as:

> "an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other things or other persons." (Friedman & Rosenman, 1974, p.84).

Rosenman (1978) has suggested that the "core" elements of this pattern of behaviour are extreme aggressiveness, easily aroused hostility, a sense of time urgency and competitive achievement striving. Friedman et al (1981) have described the important core elements as simply:

> "aggravation, irritation anger and impatience".

They further observe, as have others (eg. Jenkins, 1976; Glass, 1977a) that these behavioural characteristics should not be seen as traits but rather as well established habits. Matthews (1982) has described Type A behaviour as:

> "a set of overt behaviors that is elicited from susceptible individuals by an appropriately challenging environment." (p. 293).

Matthews (1982) also observes that the Type A behaviour pattern does not represent a "discrete typology" but is thought to be a continuum of behaviours ranging from extreme Type A (as described by the Friedman and Rosenman definition) through to those who lack significant Type A behavioural characteristics and are classified as being Type B. Further discussion of the characteristics of A and B behavioural Types can be found in Matthews (1982) and in Price (1982).

Although Friedman and Rosenman were the first researchers to describe systematically and investigate this pattern of behaviour, various of the components of Type A behaviour had been informally associated with CHD risk by earlier researchers. Ostler (1910) observed:

> "It is not the delicate neurotic person who is prone to angina, but the robust, the vigorous in mind and body, the keen and ambitious man, the indicator of whose engines is always set 'full speed ahead'." (p. 839).

Others also made similar observations (eg. Menninger and Menninger, 1936; Dunbar, 1943; Kemple, 1945). These early clues, however, were not followed up until the work of Friedman and Rosenman (1959; 1960; 1974). Friedman *et al* (1981) have speculated that these early indications of a link between a pattern of behaviour and increased CHD risk did not motivate further investigation due to a widespread fascination with mechanical approaches to diagnostic cardiology, precipitated by the development of the electrocardiograph in 1900 (see Friedman _et al_, 1981 for further discussion of this point).

Descriptions of the characteristics of the Type A pattern of behaviour share a great number of common attributes. Matteson and Ivancevich (1980) believe, however, that not enough is known about what behavioural characteristics are part of, and which characteristics fall outside of, the Type A constellation of behaviours. Price (1982) offers a similar criticism of the descriptive work on Type A behaviour. She believes that it is neccessary to know which components of the Type A pattern contribute to the pathogenic nature of this behaviour pattern and which do not. Price carried out a survey of 101 research papers (published between 1959 and 1979) which described the characteristics of Type A behaviour (see Price, 1982, p.12). She found that out of a total of 31 characteristics, the four that were most frequently cited were, _competitiveness_ (72 times), _time urgency_ (62), _aggressiveness_ (44) and _drive_ (usually described as competitive or aggressive drive-41 times). These then seem to be the characteristics which researchers in the field see as the most important aspects of the Type A pattern. It would appear that more empirical work on determining the most important characteristics of the Type A pattern is required (as far as a relationship with CHD is concerned). More descriptive information is available from the work on the components of this pattern discussed later in this chapter (section 2.4).

Before discussing specific evidence for the association between Type A behaviour and CHD, the way in which this thesis will deal with the concept of Type B behaviour must be outlined. Other researchers have tended to treat Type B as either the opposite of Type A (eg. Barnett, 1975; Jenni and Wollersheim, 1979) or as the absence of Type A behavioural characteristics (eg. Carver, Coleman and Glass, 1976). Combined with either of these approaches, it is common for researchers to be almost completely unconcerned with Type B behaviour, concentrating their interest on Type A behaviour. Most often Type B subjects are treated as a convenient control group. The consequence of this attitude is that little is known about Type B behaviour and those who possess it despite the fact that this behaviour appears to be associated with reduced risk of CHD (eg. Rosenman, Brand, Sholtz and Friedman, 1976).

It is not possible in this thesis to treat Type B subjects in the same fashion as this previous research. Experimental data (reported in chapters 6, 7, 8, and 9) indicate that Type B individuals may possess quite different performance standards from their Type A counterparts. Thus the Type B individual may not just be "non Type A" as appears to have been the presumption in most previous research (see Price, 1982). Data directly relevant to Type B behaviour are reviewed in the following two chapters although the paucity of such data is a problem in interpreting some effects reported in later chapters.

2.3 Evidence for an association between Type A behaviour and CHD

There are two main types of study which have been used to examine the nature of the relationship between Type A behaviour and CHD. Prospective studies are those in which subjects taking part are (as far as is known) healthy and free of clinical CHD when entering the study. Retrospective studies seek to examine the relationship between Type A behaviour and CHD using subjects who are already known to be suffering CHD.

2.3.1 Retrospective Studies

A number of studies have found statistical associations between Type A behaviour and CHD. Such associative and retrospective studies have used a variety of methods for Type A behavioural assessment. The following review will concentrate on studies employing the Structured Interview (SI) developed by Friedman and Rosenman (eg. Rosenman, 1978), as this appears to be the best available method for Type A assessment (eg. Friedman *et al*, 1981; Rosenman, 1978).

In an early study, Caffrey (1968; 1969) investigated the effect of their environment and behaviour on the CHD risk of 1400 Trappist and Benedictine monks. Caffrey used the SI to classify the monks' behaviour. He found that Type A behaviour related best to CHD incidence in combination with a coronary-prone environment (he was able to rate each of the 14 monasteries in his study on this dimension) and dietary fat intake. Further analyses of these data (Caffrey, 1970) indicated that Type A behaviour was a significant factor in separating cases of CHD from those who were CHD free.

Wardwell and Bahnson (1973) found that the Type A/B dimension (assessed by a modified version of the SI) distinguished hospitalized CHD patients from a group of hospitalized non-CHD patients and from a group of non-hospitalized controls, with significant reliability. An extension of this study, The Southeastern Connecticut Heart Study (eg. Kenigsberg et al, 1974), found that male and female CHD patients scored significantly higher in the Type A direction on the Jenkins Activity Survey for Health Prediction (JAS) questionnaire measure of Type A behaviour.

Retrospective studies have not only concentrated on investigating the relationship between Type A behaviour and CHD incidence, but have also attempted to associate this behaviour with precursors of CHD such as degree of atherosclerosis (assessed by coronary arteriography) and by examining possible associations between this behaviour pattern and traditional CHD risk factors.

Blumenthal, Williams, Kong, et al (1978) classified 156 patients aged 15-69, who were referred to a large medical centre for coronary arteriography, as either

Type A or Type B by use of the SI. Coronary arteriography involves injection of a radio-opaque dye into the coronary arteries, enabling the degree of coronary occlusion to be estimated from X-rays. They found Type A behaviour to be significantly associated with degree of atherosclerotic occlusion, a relationship which held when age and sex were controlled for. From a similar study Frank, Heller, Kornfeld, et al (1978) reported data which supported this finding.

A large follow-up study to Blumenthal et al (1978) was carried out on 424 patients undergoing coronary arteriography for suspected coronary artery disease (Williams, Haney, Lee, et al, 1980). Type A behaviour was assessed by SI and subjects also completed a hostility scale (Cook and Medly, 1954). Both Type A pattern and hostility were found to be significantly associated with degree of coronary athersclerosis. Support for these studies has come from a study by by Zyzanski, Jenkins, Ryan, et al (1976). They carried out a similar study in which the Jenkins Activity Survey (JAS) self-report Type A measure was employed.

There have been failures to find associations between Type A behaviour and coronary athersclerosis, however. Similar studies, to those already discussed, which have used both the JAS (Dimsdale, Hackett, Hutter, et al, 1978) and the SI to assess Type A behaviour (Dimsdale, Hackett, Hutter, et al, 1979), have failed to find significant associations between this behaviour pattern and extent of coronary atheroslerosis. Despite these two studies, however, the weight of research data indicates that a relationship between Type A behaviour and the process of coronary athersclerosis does appear to exist.

It is possible to criticise a number of aspects of retrospective studies, in comparison to prospective studies. The first of these criticisms is that, being CHD victims may affect subjects' behaviour and personality to the extent that accurate assessment of their A/B typology is made difficult. There is ample evidence for the serious, often long term effects that acute cardiac disorders (especially myocardial infarction) may have on the psychological adjustment of victims (see Garrity, 1981 for a review of the relevant literature). Gentry, Oude-Weme, Musch and Hall (1981) present data which indicate that Type A and B individuals respond quite differently to acute myocardial infarction. They found that, relative to Type B subjects, Type A subjects tended to employ more denial and to suffer higher levels of anxiety, especially about death. Assessment of Type A behaviour after a coronary event may be made even more difficult by the fact that post infarct patients appear to report more Type A behavioural characteristics than those not suffering CHD (eg. Jenkins, Zyzanski and Rosenman, 1976).

A third criticism, also concerning Type A behavioural assessment in retrospective studies, involves experimenter expectancy effects. Those who carry out behavioural assessments in these studies may be aware of the status (CHD/non-CHD) of subjects. This information may be volunteered by subjects in experiments where the assessor is supposedly blind to subjects' CHD status. Obviously behavioural assessment may be biased by this knowledge. A fourth criticism is based on the problem of sampling bias involved in retrospective studies. Matteson and Ivancevich (1980) point out that over 25% of heart attack victims die within 30 days. Thus the sample of post-infarct subjects available is biased toward those who survive.

Carefully designed prospective studies may overcome, to a great extent, the assessment and sampling problems of retrospective studies. Few large prospective studies have been carried out, however, no doubt due, to the time and expense involved as such studies are obviously longitudinal in design. The following review will concentrate on studies which attempt to associate Type A behaviour with increased incidence of CHD or to establish an association between components of the Type A pattern and CHD incidence. There is however, a large literature which seeks to associate Type A behaviour (or components of that pattern) with more traditional CHD risk factors (see Kannel, McGee and Gordon, 1976 for a discussion of these factors). This literature is dealt with in section 2.7 of this chapter.

2.3.1 Prospective Studies

The most impressive evidence that Type A behaviour is a risk factor for CHD development comes from the Western Collaborative Group Study. This large prospective study of 3,154 healthy, employed adult males between the ages of 39 and 59, was initiated in 1961. This study found the rate of new occurrence of CHD to be 13.2 per thousand each year for those subjects who showed Type A behaviour at their intake into the study. The rate for Type B subjects was 5.9 per thousand each year (Rosenman et al, 1975). Diagnoses of CHD were carried out by independent cardiologists who did not know subjects' status on standard CHD risk factors or on Type A behaviour. Postmortem examinations of subjects who died during this study showed significantly greater degrees of coronary atherosclerosis in Type A than in Type B subjects. This study also indicated that Type A behaviour acted as both an independent risk factor for CHD as well as operating through "standard" risk factors (eg. serum cholesterol level, elevated blood pressure, etc.; see Brand et al, 1976). Multivariate analyses showed that the major independent predictors of CHD in this study were systolic blood pressure, serum cholesterol level, Type A behaviour and smoking (Rosenman et al, 1976).

Thus the Western Collaborative Group Study presents strong evidence that Type A behaviour must be considered an important risk factor for CHD. The subject sample employed in this study has been criticised for a bias towards the middle socio-economic classes (eg. Steptoe, 1981) but there are few other criticisms. Friedman et al (1981) believe that, had the interview methods for Type A behavioural assessment in use in 1961 been as well refined as those in use today, the findings of the Western Collaborative Group Study would have provided even stronger evidence for the link between Type A behaviour and CHD. This contention has not been borne out, however, by the preliminary results from the Multiple Risk Factor Intervention Trial Group (MRFIT Trial Group, 1979). No significant association was found in this study between the SI measure of Type A behaviour and risk of CHD death for a large sample (n=3110) of men. This study found an inverse relationship between JAS score and risk of CHD with men classified as Type A by JAS score, being less likely to suffer CHD than their Type B counterparts (eg. Shekelle, Hulley Neaton, et al, 1983). These data are from a large (total n=12,772 for JAS data), apparently well designed, prospective study which payed particular attention to accurate SI assessment procedures (see MRFIT Trial Group, 1979). Despite the fact that the weight of data reported in the literature support the association between Type A behaviour and CHD, these data from the MRFIT study must be seen as casting some doubt on this area of research. More analyses from this study must be assessed, however, to ensure that the preliminary conclusions are not a product of some flaw in the study.

Other large prospective studies have been carried out which have not employed the SI method of Type A assessment. Floderus' (1974) Swedish study found that self-report items which assessed feelings of time pressure and high job responsibility were related to subsequent development of angina pectoris. This study did not employ a specific Type A measure, however, and while the dimensions which were found to predict CHD incidence may be components of the Type A pattern, this is by no means certain. In another Swedish study Theorell, Lind and Floderous (1975) collected self-report data by mail from over 6,000 construction workers. Approximately 12 months later these researchers found that their Type A measure was a significant predictor of myocardial infarction. The measure of Type A behaviour employed in this study is of doubtful reliability and validity however, as it was only 5 items long. Data are also available from the Framingham Study which show a significant association between a 10-item self-report measure of Type A behaviour and CHD incidence in male and female subjects at an 8 year follow-up (Haynes, Levine, Scotch, et al, 1978). Self-report scales are suspected of being much less valid measures of Type A behaviour than the SI (this point is discussed in section 2.5) so it is unwise to place a great deal of weight on the findings of these studies.

Two prospective studies have been reported recently which offer support for the notion that the Type A behaviour pattern has a predictive association with incidence of CHD through a hostility component of the pattern (eg. Shekelle, Gayle, Ostfeld and Ogelsby, 1983; Barefoot, Dahlstrom and Williams, 1983). The evidence that hostility constitutes an important component of the coronary-prone behaviour pattern is discussed later in this chapter (in section 2.6).

From the prece ding selective reviews of both prospective and retrospective studies there appears to be little doubt that there is an association between the Type A pattern of behaviour and incidence of CHD. This was the finding of The Review Panel on Coronary-Prone Behaviour and Coronary Heart Disease (1981), set up after a conference on Type A behaviour sponsored by the United States National Heart Lung and Blood Institute in 1978. The panel concluded that:

> "the available body of scientific evidence (demonstrated) that Type A behaviour is associated with an increased risk of clinically apparent CHD in employed, middle-aged U.S. citizens." (p.1200).

The panel also concluded that Type A behaviour was associated a similar degree of CHD risk as systolic blood pressure, serum cholesterol level and smoking. The conclusions of this panel were made before any data were available from the MRFIT study however. The panel may have been more cautious in its conclusions had these data been available.

2.4 Aetiology of Type A Behaviour

Research into the aetiology of the Type A pattern is not directly relevant to the research to be reported here. Such work (and research aimed at identifying important components of the pattern which is discussed in section 2.6) is briefly reviewed as it serves to illustrate further the nature of this pattern of behaviour.

The research discussed here may have been encouraged by evidence that Type A behaviour is learned and therefore, theoretically, preventable and modifiable. Rahe, Hervig and Rosenman (1978) have reported from a large study of identical and fraternal twins that Type A behaviour does not appear to be heritable. There has been widespread acceptance of the notion that Type A behaviour constitutes a learned pattern of responding to the environment (see Glass, 1977b). Friedman et al (1981), indeed, have proposed that the Type A pattern of behaviour is:

> "fundamentally due, in the majority of cases, to a basic insecurity arising from an earlier or contemporary failure to experience unconditional love and affection.".

Thus Friedman et al are suggesting that Type A individuals are chronically involved in a struggle to achieve, in order to prove their worth to themselves and to others. Friedman et al believe that Type B individuals already tend to possess a sense of their own "self-worth" and therefore do not engage in the Type A pattern of behaviour. This theorizing is both elegant and plausible (and is discussed further in Price, 1982).

Some research in this area has concentrated on the possibility that Type A behaviour may be acquired through family links and interaction patterns. Bortner, Rosenman and Friedman (1970) found a significant difference between the Type A scores of adolescent boys whose fathers were Type A and boys whose fathers were classified as Type B. Matthews, Glass and Richins (1977) have proposed that characteristics of child rearing by parents are likely to play a part in the development of Type A behaviour. They report that Type A children (4-10 years) received more maternal dis approval and encouragement to try harder after good performance than Type B children. As it was not possible to determine from this study whether the mothers' behaviour elicited Type A behaviour from their children or whether the childrens' behaviour pattern elicited this critical response from mothers, another study which used mother substitutes was designed by Matthews (1977). She found that substitute caretakers gave Type A children more encouragement and urging to improve their performance than they gave to Type B children. Matthews suggests that these data indicate the existence of a "snowballing" effect, with child rearing practices tending to encourage Type A behaviours in children. Price (1982) suggests that western society in general encourages children to produce these behaviours which then serves to elicit more urging to improve from parents and other adults (see Matthews, 1978).

Butensky, Faralli, Heebner and Waldron (1976) report that rural children show less Type A characteristics than urban children. They attribute this to the more limited and better defined goals available to rural dwellers. Butensky et al also found a tendency for adolescents to exhibit large, situationally determined, fluctuations in the degree to which they manifest Type A behaviours. Such fluctuations would obviously cause problems for researchers attempting to investigate the development of Type A behaviour during childhood and adolescence. Recent studies have indicated, however, that Type A behaviour can be reliably identified in children and adolescents (see Matthews, 1978 for a discussion of methods for Type A assessment in children). Recent studies have reported differences between Type A and B children in the extent to which they possessed some standard CHD risk factors. Two such studies are reviewed in section 2.7 which is concerned with possible mechanisms linking the Type A behaviour pattern and CHD.

Thus it appears that Type A behaviour may develop in childhood but the exact nature of this developmental process is unclear. More research is obviously necessary to determine the exact nature of the process by which children adopt Type A behavioural characteristics.

2.5 Assessment of Type A Behaviour

2.5.1 Introduction

The following does not constitute an exhaustive review of the research into methods of Type A behavioural assessment. In an attempt to structure this section and to limit the length of this review, this section will concentrate on methods of Type A behavioural assessment which are employed in this thesis. This selectivity is mainly made necessary by the number and variety of methods of assessment which are available. This review will give most weight to assessment techniques which have been found to predict CHD incidence.

2.5.2 The Structured Interview

The structured interview (SI) was developed by Friedman and Rosenman and associates (eg. Friedman, Rosenman and Byers, 1964) at the Harold Brunn Institute in San Francisco. The SI was designed to assess the behavioural characteristics which Friedman and Rosenman believed, from their clinical impressions, to be associated with incidence of CHD. In the SI a trained interviewer asks about 25 questions designed to elicit information about the subject's normal mode of dealing with, and responding to the environment. The SI questions are asked of subjects in a interview setting by a single interviewer. Interviews are usually videotaped to facilitate rescoring of the subject's responses.

Two slightly differing versions of the interview are the main ones in use and being taught at the moment. One is being used by Rosenman and associates at the Stanford Research Institute in Menlo Park California (see Chesney, Eagleston and Rosenman, 1980 for detail). This is a general interview which seeks to challenge and engage subjects in order to elicit Type A behaviours from them. Friedman and his associates are using a version which includes some questions specific to post-infarct patients in the Recurrent Coronary Prevention Project at the Harold Brunn Institute (see Friedman, Thoresen, Gill, et al, 1982). With the exception of the specific items concerning CHD these two versions of the SI are very similar.

The author learned the SI in use at the Harold Brunn Institute. The interview used by the author is discussed further in chapter 5 but general details about the SI are provided here. Copies of the SI questions and a score sheet are provided in appendix B. The SI contains items which score on either of 2 components which Friedman and Rosenman (1974) believed were the basic components of the Type A pattern (research concerning components of the pattern is discussed in detail in section 2.6 of this chapter). Following are examples of items which are scored on either the "time urgency" (questions 1 and 10) or the "hostility" (question 21) components of the SI. It is apparent from the score sheet in appendix B.4 which items score on each of these components and a summary of items and scoring procedure is provided below.

Questions such as:

> "1. Do you think that you are a hard-driving, no nonsense sort of achiever, or do you believe that you tend to do things in a rather leisurely manner?" (eg. Friedman _et al_, 1981),

ask subjects about their usual mode of dealing with or responding to their environment. In other questions, such as:

> "10. Most working people usually arise before 8.30 am on weekdays although they may sleep in longer on Saturdays and Sundays. Now in your case, during the weekdays, at what time do you, uh ......" (eg. Friedman _et al_, 1981).

the interviewer deliberately stalls. This is a direct behavioural test of subjects as Type A subjects will often interrupt or hurry the interviewer.

A number of questions in the SI allow the interviewer to challenge the subject's response or to probe for more information where it might be relevant. Such a question is:

> "21. What would you do if you and your wife were at a fine restaurant and she was becoming ill from the cigar smoke reaching her from a man sitting at the table next to yours?" (eg. Friedman _et al_, 1981).

Even if this question fails to elicit a Type A style of response, the subsequent challenge:

"Suppose the smoker says-drop dead, mister"

is designed to elicit a hostile response from a Type A subject. In comparison Type B subjects very often respond to such a challenge with a curious, half-amused expression (see Friedman et al, 1981). The interviewer presents the questions in a standardized manner, with standardized probing for further information also being possible.

The SI scores the subject's behaviour and the content of specific replies to questions. Behaviours which score on the time urgency component are facial tension, rapid eye movements (usually horizontal), rapid blinking (over 40 times per minute), knee jiggling or rapid finger tapping, rapid speech (often dysrythmic or characterized by elision of the last word of a sentence) and clicking of the tongue against front teeth during normal speech. Three direct behavioural tests (see items 8, 10 and 15 in appendix B.4) to determine whether subjects will interupt the interviewer are also employed in the SI to assess time urgency.

The SI scores the content of the subject's replies to certain items on the time urgency component. Such content may consist of subjects reporting that they habitually engage in 2 activities at once (polyphasing), that they often think about other matters during conversation, that they eat and walk fast, and they prefer not to dawdle after eating. Reports of making a fetish of always being on time, having difficulty in doing nothing, substituting numerals for metaphors and having recently been told to slow down by their spouse are also scored as indicators of time urgency.

Content which is scored on the hostility component includes reports of easily aroused irritability, general distrust of other people's motives and excessive competitiveness (especially with small children). Direct behavioural tests of hostility are provided by the interviewer challenging some comment by the subject (example provided in item 21 discussed above) and by questions about the subject's views on topics such as politics, women, and Doctors which may elicit hostile generalizations (eg. the author interviewed one subject who asserted that "all Doctors are blood suckers").

Behavioural manifestations of hostility scored in the SI include aggressive facial set, tic-like aggressive grimace (drawing back corner of lips), hostile/jarring laugh, pounding with clenched fist, unpleasant voice (explosive, loud, staccato, etc.), use of obscenity and expression of anger at recalling some event in the past. A more detailed description of these Type A responses is provided by Friedman (1979).

Any of these verbal and behavioural responses elicited by the specific challenges and the interview situation, are checked by the interviewer. The weights assigned to each (see the score sheet in appendix B.4) are summed to yield total scores on the time urgency and hostility components of the Type A pattern. Researchers, however, have most often used the sum of these subscales as a total score for Type A behaviour (see Friedman, 1979 for a more detailed analysis and description of the SI).

In early research employing the SI (eg. the Western Collaborative Group Study) interviews were audiotaped to allow later rescoring of the subject's responses and speech characteristics. Recent research has tended to employ videotaping as this also allows rescoring of behavioural characteristics. Friedman et al (1981) believe that the videotaping procedure adds to the challenge of the SI for subjects and have incorporated videotaping as a standard procedure in their interviews, referring to this procedure as the "videotaped structured interview" (VSI). More extensive descriptions of the SI development, presentation and scoring data can be found in papers by Rosenman (1978), Chesney et al (1980) and Friedman et al (1981).

Good levels of reliability and validity have been reported for the SI. In the Western Collaborative Group Study the two interviewers agreed in their categorization of subjects in 84% of cases (Jenkins, Rosenman & Friedman, 1968). Caffrey (1968) has reported inter-rater aggreement of 75-77% for the SI. Jenkins, Rosenman and Friedman (1968) believe that the levels of agreement which they obtained were excellent for an interview technique and are comparable to levels usually reported for medical diagnoses made from electrocardiograms and chest radiographs.

Reasonable levels of test-retest reliabiltiy have also been reported for the SI. Of subjects who were placed in the same category by the original Western Collaborative Group Study raters, 80% were placed in the same categories in a round of interviews carried out approximately 12 to 20 months later (Jenkins et al, 1968). Keith, Lowen and Stare (1965) reinterviewed subjects at a 3 to 18 months follow-up to find a 74% agreement with original categorization.

Mattheson and Ivancevich (1980) suggest that these reliability levels are acceptable, given that this is a dynamic behaviour pattern which may be expected to show some degree of change over time. They also stress that, despite its standardization, the SI continues to be a subjective measure. It is possible that different interviewers, or non-standard presentation by the same interviewer on a different occasion, may influence the subject's responses. Data have been reported, however, which indicate that interviewer variations do not greatly affect subject responses (Scherwitz, Berton & Leventhal, 1977) although the degree of emphasis which the interviewer uses appears to affect subjects' involvement in the interview. Added to this are data reported by Howland and Siegman (1982) who found a correlation between interviewer and subject speech characteristics, indicating that there is a need for standardization of interview technique.

2.5.3 The Jenkins Activity Survey

Apart from the SI, the most widely used method of Type A behavioural assessment is the Jenkins Activity Survey for Health Prediction (JAS). This self-report measure was developed in an attempt to mimic the SI Type A/B categorization with an objective psychometric instrument (Jenkins, Rosenman & Friedman, 1967). The JAS was constructed from multiple choice versions of SI questions and from other items felt by those who composed it to reflect Type A characteristics. Early validation of the initial 62-item JAS was carried out using subjects from the Western Collaborative Group Study (see Jenkins, 1978). A 73% agreement was achieved between the JAS and Western Collaborative Group Study interviews carried out in 1969 and 1962 (eg. Jenkins, 1978).

Form B of the JAS was developed for use with employed adults of both sexes from items which were found to discriminate CHD cases in a sample of male subjects in the Western Collaborative Group Study (eg. Jenkins, 1978). A computer scored version of form B, with item weights determined by discriminant function analyses was subsequently developed (Jenkins, Zyzanski and Rosenman, 1979). This version of the JAS scored on 4 factors which were named Type A, speed and impatience, hard-driving aggressiveness and job involvement (see Jenkins et al, 1979). The Type A sub-scale is the scale which was found to correlate most strongly with SI assessments of Type A behaviour. This sub-scale which employs 21 items of the JAS scale was used to select subjects for the first 2 laboratory experiments reported here (in chapters 6 & 7). The total JAS consists of 54 items. The instruction page of the JAS (form B) is included in appendix A and the use of this scale is discussed further in chapters 4 and 5. Glass and his associates developed a student form of the JAS (form T-Glass et al, 1974; Glass, 1977b) which has been used very widely (a copy of this scale is included in appendix A).

Data on test-retest reliability of the JAS have been reported. Jenkins, Zyzanski and Rosenman (1971) have reported reliability of 0.66 at a one year test-retest. A four year test-retest study of over 2000 people showed that 90% of subjects' JAS scores had changed less than one standard deviation. Jenkins et al (1979) report internal consistency coefficients of 0.83 and 0.85 for the Type A sub-scale of the JAS. They found coefficients ranged from 0.73 to 0.83 for the other 3 sub-scales. Matteson and Ivancevich (1980) observe that the reliability levels which have been reported for the JAS are acceptable and compare with those which might be expected for other similar psychometric instruments and physiological measures. Ray and Bozek (1980) are rather more critical of these figures, however, suggesting that better levels of reliability are necessary in an instrument which purports to be a useful clinical tool. Jenkins et al (1979) state in the manual for the JAS that it is not designed for clinical use, however. Despite this assertion the JAS has come to be regarded as a clinical instrument (see Matteson and Ivancevich, 1980). Thus criticisms like the one by Ray and Bozek must be assessed in the light of the ability of the JAS to predict CHD, the use for which it was designed.

The JAS was used with the SI in the later stages of the Western Collaborative Group Study and was found to differentiate CHD from non-CHD cases although not as well as the SI (Jenkins, Rosenman and Zyzanski, 1976). The JAS has been associated prospectively with incidence of new cases of CHD (Jenkins et al, 1974). The JAS has been shown to be correlated, retrospectively, with diagnosed CHD (Shekelle, Schoenberger and Stamler, 1976). The JAS classification of Type A behaviour has been found to be associated with increased incidence of CHD in a number of retrospective studies (see Jenkins, 1978). However, the JAS has been found to misclassify about one third of respondents in comparison to the SI which is widely accepted as being the best available Type A measure for prediction of CHD (eg. Jenkins, 1976; 1978; Chesney et al, 1980; Friedman et al, 1981). The level of agreement between JAS and SI is improved for more extreme scorers. Jenkins, Zyzanski, Rosenman and Cleveland (1971) found a 90% agreement between JAS and SI classification for subjects who scored more than one standard deviation away from the mean on the JAS. Explanations which have been offered for the lack of agreement between JAS and SI and for the fact that it is not as accurate a predictor of CHD as the SI, are discussed later (in section 2.5.5).

Due to its ease of application and proven association with CHD the JAS is by far the most widely used of the available psychometric methods for Type A behavioural assessment. It is a relatively long scale however (54 items) and in the author's experience may take subjects anything up to 30 minutes to complete. Other scales which take less time to complete have been developed and are discussed below.

2.5.4 Other Methods for Type A Behavioural Assessment

Recently a 10-item self-report measure developed for use in the Framingham study was found to be associated (prospectively) with CHD incidence at an 8 year follow-up (Haynes, Levine, Scotch, et al, 1980) for both men and women. This scale has not been employed to predict CHD incidence in other studies. Chesney, Black, Chadwick and Rosenman (1981) found this scale correlated only moderately with SI scores, however, ($r=0.20$, $p<0.01$) in a study of 384 adult males. A slightly higher correlation was found ($r=0.28$) when only the first 5 items of the scale were used.

The Bortner Short Rating Scale (Bortner, 1969) is a 14-item scale designed to mimic SI classification of Type A behaviours. Bortner has reported 64-75% agreement between this scale and the SI. This scale has not been used widely but its reliability and validity appear to be about as good as reported for the JAS (eg. Price, 1979). A 7 item short form of the Bortner Scale has been found to correlate quite well with the full 14 item form (Price, 1979). The Bortner scale has been associated (retrospectively) with CHD incidence in a study by Heller (1979) who found that CHD victims had significantly higher Bortner Scale scores than non-victims. Although a recent Belgian study failed to find any assosciation between Bortner Scale score and angiographic findings (Kornitzer et al, 1982), scores on this scale have been associated with peripheral vascular atherosclerosis in another European study (eg. Adler & Galeazzi, 1977, cited by Jenkins and Zyzanski, 1982).

Vickers (1973; Caplan, Cobb and French, 1975) developed a 9-item Type A scale, from an original measure by Sales (1969a), for use in research on organizational and occupational stress. Reliability and validity data have not been reported for this scale, although an alpha coefficient of 0.80 has been reported, suggesting good internal consistency (Vickers, 1973). French and Caplan (1969) have reported a relationship between the Vickers and JAS scales and a relationship between the Vickers scale and coronary risk factors. Pittner and Houston (1980) report a correlation of 0.37 with the JAS, suggesting at least some construct validity. Type A behaviour as measured by this scale, has not been related to incidence of CHD. Sales attempted to associate the original measure with serum cholesterol levels but only found significant effects for subjective ratings of task overload and underload. A copy of the Vickers Scale is included in appendix B.

A number of other measures of Type A behaviour have been developed which have not been related directly to CHD incidence and for which reliablity data are not available. Rahe, Hervig and Rosenman (1978) carried out an item analysis to produce a list of adjectives from the Adjective Checklist (Gough and Heilbrun, 1975) which related significantly to the SI. Chesney et al (1981) found this measure to be significantly related to the SI ($r=0.31$, $p<0.001$). The Activity subscale of the Thurstone Temperament Schedule (Thurstone, 1953) was also found by Chesney et al (1981) to be significantly related to the SI ($r=0.32$, $p<0.001$).

Some work on analysis of speech characteristics to assess Type A behaviour has also been reported. Friedman, Brown and Rosenman (1969) found an 84% agreement between the SI and a method of Type A classification by speech analysis. Schucker and Jacobs (1977) have also reported impressive preliminary results from a method which they developed for assessing Type A speech characteristics. Recently Howland and Siegman (1982) reported an excellent 89% agreement between the SI and their semi-automated method of Type A assessment from speech characteristics, including volume and pace of speech, and verbosity. All of these methods of Type A behavioural assessment show promise but further research, especially that designed to test the utility of these instruments in predicting new cases of CHD, is obviously necessary before they can be confidently employed in research programs. Analysis of speech characteristics, especially if partial or full automation is possible, must be seen as having particular appeal in objectifying Type A behavioural assessment. Problems with the objectivity and utility of methods presently employed for Type A behavioural assessment are discussed below.

2.5.5 Possible sources of bias in the assessment of Type A behaviour

The SI is widely accepted as being the best method available for Type A behavioural assessment, using utility in prediction of CHD as the chief criterion of validity (eg. Chesney *et al*, 1980; Friedman *et al*, 1981). The SI also appears to be slightly more reliable than the other self-report methods of assessment for which reliability figures have been reported. Methods of speech analysis have shown promise but insufficient data on them have been reported to allow comparison between them and the SI. This discussion will be confined to the SI and self-report measures, in particular the JAS which is the most widely used of these measures.

The superiority which the SI has in predicting CHD incidence, may be attributed to two main advantages which it has over the self-report measures. Firstly, the

SI appears to challenge subjects and to involve them, so as to elicit Type A behaviours from susceptible individuals (eg. Friedman _et al_, 1981). Obviously the self-report measures are not able to accomplish this active engagement and elicitation of behaviour, although they might be imagined to challenge subjects to some degree. Friedman _et al_ (1981) suggest, however, that Type A individuals are impatient with questionnaire procedures and generally fail to give full attention to them.

Secondly, the most important information for SI classification of subjects, is provided by the interviewer's observation of their behaviour during the interview (eg. Rosenman, 1978). Such information is lost in a self-report method of assessment. Rosenman (1978) believes that this problem of loss of vital behavioural information cannot be completely compensated for by questioning subjects about their usual style of behaviour (using questionnaire techniques). He reports that Type A individuals often seem unaware of their own Type A characteristics. He describes this ignorance of their own behaviour pattern as occuring in some Type A individuals to such an extent that their self-reports of their own behaviour are almost totally innaccurate (see Rosenman, 1978). A study by Herman, Blumenthal, Black and Chesney (1981) indicates that Type A individuals may be aware of attributes of their behaviour pattern which they see as positive (eg. describing themselves as "dynamic" and "action-oriented") but tend to overlook less desirable attributes (eg. avoiding descriptors like "hasty" and "impulsive"). Thus it appears that Type A individuals may not be aware of important aspects of their own behaviour such as their hostility, drivenness and egocentricity (eg. Herman et al, 1981).

Thus self-report measures appear to lack a great deal of the information which is available to the interviewer employing the SI. Rosenman (1978) suggests that there is a paradox in this situation where "subjective" ratings of behaviour (albeit by a trained interviewer), appear to be more useful than the use of "objective" self-report measures. It is the proven inaccuracy of Type A subjects' subjective impressions and reporting of their own behaviour which has created this paradox however. Fiske (1980) has suggested that subjects' self-reports, especially about their internal processes, may not be as veridical as is often presumed in behavioural research. He rejects the ready acceptance of such self-reports as objective data proposing that greater objectivity is possible using reports by observers. This is especially so if consensus between trained observers and intensive re-analysis of recorded behaviour are possible (see Fiske, 1980). Both of these techniques are commonly employed in Type A classification by use of the SI. Thus the SI interviewer's ratings may be seen as providing more objective information than is available to the self-report measures from the subjects themselves.

The SI is obviously not without it own sources of bias and innaccuracy, however. One possible source of bias is the style of the interviewer. Variations in the pace and emphasis of the interviewer may affect subjects' own pace of speech (eg. Howland and Siegman, 1982) and involvement in the SI procedure (eg. Scherwitz, Berton and Leventhal, 1977). Price (1982) suggests that non-verbal cues from the interviewer and demographic variables such as the subject's age, sex and nationality may also affect responses to the SI.

2.5.6 Other problems in the assessment of Type A behaviour

It is evident from the preceding discussion, that the SI is the best method available for Type A behavioural assessment. The cost of training interviewers and costs incurred in actual use of the SI, however, tend to limit widespread use of the SI in clinical and research settings (eg. Price, 1982; Herbertt, 1983). The problem of cost is obviously exacerbated for researchers outside of the mainstream of Type A behavioural research being carried out in the United States. It is necessary for such individuals to travel to the United States to be trained in the use of the SI. These problems are discussed in greater detail in a paper by the author (Herbertt, 1983) which is included in appendix I).

These problems with the SI must force many researchers in this field to employ self-report measures (as was the case early in the research program reported in this thesis). This will, however, ensure the continuation of research into improving self-report measures and in the promising area of speech analysis. These alternatives to the SI (and the JAS) need assessment in well-controlled prospective studies of CHD incidence before any will gain wide acceptance as alternatives to the SI. Correlating such measures with the SI appears to be a good method of determining which are worth the time and expense of such assessment (see chapter 5).

2.6 Components of the Type A Pattern

The following describes research into components of the Type A pattern which appear to be associated with an increased incidence of CHD. Thus it has been necessary to report some experimental evidence for the relationship between Type A behaviour and CHD in this section. The main body of such evidence was presented previously (in section 2.3 of this chapter). It is intended that the following review also add empirically derived descriptions of Type A behavioural characteristics to the more consensus-based descriptions of the pattern already provided (in section 2.2) and criticised by Matteson and Ivancevich (1980) and Price (1982).

Friedman and Rosenman (1974) proposed, from their early clinical impressions, that the most important components of the Type A pattern of behaviour were _time urgency_ and _hostility_. Recent empirical evidence suggests that both of these components are associated with increased incidence of CHD. Williams, Haney, Lee, _et al_

(1980) found two measures of hostility (the Structured Interview measure and an MMPI measure developed by Cook and Medly, 1954) correlated positively with degree of atherosclerosis. Barefoot, Dahlstrom and Williams (1983) found hostility (as assessed by the Cook and Medly scale) was significantly associated with clinical coronary disease incidence at a 25 year followup of 255 physicians who completed the MMPI in medical school. Using the same hostility measure, Shekelle, Gayle, Ostfeld and Ogelsby (1983) also found an association between hostility and increased incidence of CHD at a 10 year followup of a sample of 1877 employed middle-aged men.

Re-analyses of data from the Western Collaborative Group Study (Rosenman, Brand, Jenkins, et al, 1975) have supported the notion that time urgency or impatience is related to increased incidence of CHD. Matthews, Glass, Rosenman and Bortner (1977) found five major components of Type A behaviour from original audiotaped interviews. These were competitive drive, past achievements, impatience, non-job related achievements and speed. Only competitive drive and impatience (or time urgency) were reliably associated with incidence of CHD. More research into the status of time urgency as a component of the Type A pattern is reviewed in the next chapter (section 3.3).

Thus time urgency and hostility may be central components of the Type A behaviour pattern. It is still difficult, however, to determine the contribution of many other characteristics of Type A individuals to their increased risk of CHD. Obviously components which do not contribute to the prediction of CHD incidence may best be discarded from descriptions of this behaviour pattern as they must tend to confuse research efforts. Such a proceedure should be undertaken with care, however, as many researchers believe that there is a constellation of related behaviours which make up the Type A pattern (eg. Glass, 1977b; Jenkins, 1976, Rosenman, 1978, Friedman _et al_, 1981; Price, 1982). Behaviours which do not directly predict CHD incidence may continue to be useful in the identification of persons possessing the more central components.

Obviously more research is required to determine the contribution of components of this pattern both to prediction of CHD incidence and to the assessment of Type A behaviour. Although there is good evidence that _time-urgency_ and _hostility_ are central components of the Type A pattern of behaviours, the contribution of other components has not been elucidated.

2.7 Possible Physiological Mechanisms Linking Type A Behaviour and CHD

A great deal of research has been carried out in an effort to elucidate the mechanisms by which Type A behaviour is related to increased incidence of CHD and to the process of coronary atherosclerosis. This research has tended to concentrate on possible links between the standard CHD risk factors and the Type A pattern. Evidence from the Western Collaborative Group Study (eg Rosenman et al, 1975) and the Framingham Study (eg. Haynes et al, 1978) has indicated that Type A shows an association with CHD which is independent of the standard risk factors. There is evidence from a number of studies that part of this influence may be through the effects of the "stress hormones" (catecholamines), especially norepinephrine.

The "fight-flight" response, activated by the hypothalamus via the sympathetic-adrenal-medullary system (eg. Cannon and de la Paz, 1911) prepares the body to deal with threat. Recent evidence suggests that production of epinephrine is related to the need for flight, while norepinephrine tends to be produced in situations which require struggle or a fight (see Henry, 1982). There is evidence that Type A individuals show greater elevations in plasma norepinephrine than Type B individuals during their normal working day (eg. Friedman, St. George and Byers, 1960). Type A individuals also appear to show elevations in norepinephrine (eg. Friedman et al, 1975) and in epinephrine (eg. Glass, Krakoff, Contrada, et al, 1980) when challenged. Such findings are quite in keeping with the earlier descriptions of Type A individuals (see section 2.2 and Friedman & Rosenman, 1974) as aggressive, rushed individuals who thrive on challenges. Both epinephrine and norepinephrine (but especially the latter) may be related to increased risk of CHD development through a number of processes which are mentioned briefly here.

Norepinephrine may both initiate and hasten the process of atherosclerosis by causing damage (endothelial lesions) to the walls of coronary arteries (eg. Ross & Glomset, 1976). Elevations in norepinephrine production are also associated with increase in cardiac output (eg. Henry & Stephens, 1977). Type A subjects have been shown by Dembroski and colleagues (1977; 1979) to manifest increased heart rate in response to challenging cognitive activity. This increased heart rate may be associated with angina (eg. Schneiderman, 1978) or may precipitate a cardiac event in an individual with advanced atherosclerosis (eg. Friedman et al, 1981). High levels of plasma epinephrine and norepinephrine may also precipitate ventricular fibrillation and consequent sudden death (eg. Herd, 1978; see Friedman et al, 1981 for further discussion of these points).

Norepinephrine production has also been associated with peripheral vasoconstriction of arterioles to enable blood supply to be redirected to the skeletal muscles (see Henry and Stephens, 1977). These physical changes, associated with sympathetic nervous system arousal and the fight/flight response, are obviously more adaptive in primitive society where these options are viable, than in modern society. It is seldom possible to flee the mental stress which characterizes our society, thus constant sympathetic nervous system response to mental stress (mediated by elevated catecholamine levels), is likely to be injurious to the cardiovascular system in the long term (see Bieliakauskas, 1982 for much greater detail on the nature of this process). This chronic sympathetic nervous system arousal is also likely to be associated with elevated blood pressure (eg. Diamond, 1982).

Research associating Type A behaviour with elevated blood pressure has been reported. In comparison to Type B individuals, Type A individuals (assessed by SI) have been shown to manifest significant elevations in systolic blood pressure (eg. Dembroski, MacDougall, Herd and Shields, 1979; Manuck & Garland, 1979; Glass, 1980) and in diastolic pressure (eg. Dembroski, MacDougal & Lushene, 1979) in response to challenge (see Houston, 1983 for a review). At least four studies, however, which employed the JAS to classify Type A and B subjects, have failed to find differences in blood pressure levels between Type A and B subjects in challenging situations (Lott & Gatchel, 1978; Price & Clarke, 1978; Manuck, Corse and Winklman, 1979; Waldron, Hickey, McPherson, _et al_, 1980). This may serve to emphasize the shortcomings of self-report measures in assessment of the Type A behaviour pattern (discussed in section 2.5) but a recent critique of the Type A behaviour and blood pressure literature suggests that there are serious problems in this area of research.

Holmes (1983) carried out a review of the research on the Type A pattern and blood pressure and heart rate effects in which he evaluated magnitude as well as direction of reported effects. He concluded that this literature failed to provide consistent evidence that Type A individuals manifest elevated diastolic pressure or heart rate in comparison with Type B individuals when responding to challenge. He also concluded that, although Type A individuals do reliably exhibit elevations in systolic pressure in response to stress (in comparison with Type B individuals), the average effect size is small. The only hypothesis that Holmes is able to draw from this treatment of the literature is that there may not be a strong link between Type A behaviour and physiological arousal. Further well controlled studies are obviously required to elucidate the nature of the association between Type A behaviour and blood pressure effects. It appears that accurate methods of Type A behavioural assessment are imperative for such research.

There is evidence that chronic sympathetic arousal, as manifested in elevations of serum norepinephrine level, amongst Type A individuals, may be related to CHD incidence through the process of atherosclerosis (eg. Uhley & Friedman, 1959). Norepinephrine mobilizes free fatty acids (eg. cholesterol and tryglicerides) from adipose tissue (eg. Rosell and Belfrage, 1975). This process may explain the elevations in plasma tryglycerides (eg. Friedman _et al_, 1964; Friedman _et al_, 1970) and cholesterol levels (eg. Friedman and Rosenman, 1959; Friedman and Rosenman, 1971) which have been found amongst Type A individuals in comparison with their Type B counterparts. This may occur even in children and adolescents who display the Type A behaviour pattern. Hunter, Wolf, Sklov, _et al_ (1982) have reported high blood pressures and elevated tryglyceride levels for Type A children (10-17 years old) in comparison with Type B children.

Type A behaviour may also be associated with sudden cardiac death, mediated by CHD, through two other mechanisms associated with chronic sympathetic arousal and norepinephrine production. Elevations in plasma norepinephrine may be associated with the reduced blood clotting time which characterizes Type A in comparison with Type B individuals (Friedman _et al_, 1958; Friedman & Rosenman, 1959). This rapid clotting may be promoted by enhanced aggregation of platelets which has been found amongst Type A in comparison with Type B individuals (Simpson _et al_, 1974). This clotting problem may be exacerbated by the fact that Type A individuals also appear to suffer greater sludging of erythrocytes (red blood cells) after ingestion of a fatty meal, than Type B individuals (Friedman _et al_, 1964). Enhanced clotting and sludging found amongst Type A individuals, in association with a degree of occlusion of coronary arteries, may greatly increase these individuals' risk of coronary thrombosis (see Friedman et al, 1981 for a detailed discussion of the mechanisms involved).

Apart from the mechanisms already (briefly) discussed, Type A behaviour may also be related to increased incidence of CHD through its impact on the Pituitary-adrenal-cortical system. At this stage the exact nature of the hypothesized link between this system and the Type A pattern is not clear. A brief outline of mechanisms which are suspected of disrupting this system, thereby disturbing the homeostasis of the organism, is given below.

Vigilance and anticipatory behaviour may be associated with activation of the pituitary-adrenal-cortical system and low self-esteem may be associated with reduced activation of this system (see Henry & Stephens, 1977). Glass (1977b) has provided evidence to suggest that Type A individuals tend to be hyper-vigilant and hyper-responsive to threats of loss of control. He has also proposed that Type A individuals are more likely to experience helplessness in response to repeated, highly salient, loss of control (the evidence for this is reviewed in the next chapter).

There is also evidence to suggest that Type A individuals do not possess a stable sense of self-worth (eg. Price, 1982; Friedman et al, 1981). Type A subjects may suffer disruptions of the sympathetic-adrenal-medullary system when struggling to maintain control (this process has already been discussed). This may frequently alternate, however, with disruption to the pituitary-adrenal-cortical system when this struggle is not successful (which results in feelings of reduced self-esteem, see Price, 1982). Perhaps the main CHD related risk associated with activation of the pituitary-adrenal-corticol system, is that such activation is associated with vasoconstriction of the skeletal muscles resulting in elevated blood pressure (eg. Williams, Bittner, Buschbaum and Wynne, 1975). Price (1982) provides more comprehensive evidence for the existence of this process than would be relevant here.

Thus the main thrust of research into mechanisms linking Type A behaviour and CHD appears to involve investigation of aspects of chronic sympathetic nervous system arousal which is seen as characteristic of Type A individuals. Such chronic arousal may, in the long term, cause continuous high levels of catecholamine release and disruption of the homeostasis of both the sympathetic nervous system and the cardiovascular system. This may increase the organism's sensitivity to catecholamines (even in normal concentrations-see Schneiderman, 1978). Therefore Type A individuals may be more vulnerable to the physiological effects of external stressors (eg. Schneiderman, 1978). Price (1982) has suggested that this chronic sympathetic arousal which characterizes Type A individuals may increase the effects which stressful life events have on them in comparison to the relatively unaroused, Type B individuals.

The possibility of a relationship between Type A behaviour and life events was first assessed by Glass (1977b) who found a relationship between life events and hospitalization (for coronary and for non-coronary patients) but found no direct relationship between Type A behaviour and number or impact of life events. Byrne (1981) found significant relationships between Type A behaviour, and frequency and impact of stressful life events reported by 120 survivors of myocardial infarction. He believes that Type A individuals, who may be less well able to cope with stressful events (due to a history of sympathetic arousal), experience more stressful events than their Type B counterparts. Obviously a more complete understanding of the way in which Type A behaviour is related to health risk (than is presently available) may require close study of the complex interplay of dispositional (Type A/B), situational (external stressors) and physiological factors.

Further evidence that risk factors for CHD may be related to Type A behaviour via moderating external factors comes from a study by Chesney, Sevelius, Black, Ward, Swan and Rosenman (1981). They found that the Type A pattern was associated with elevated diastolic and systolic blood pressure only where there was a lack of autonomy in behaviour in the work setting. The importance of control to Type A individuals is considered further in chapter 3.

The preceding treatment of research into mechanisms which may link the Type A pattern of behaviour and increased incidence of CHD has necessarily presented an incomplete overview of the work in this area. A presentation and integration of all work that has been done in this area would be far beyond the scope of this thesis. In the next chapter, studies which have investigated psychological aspects of the Type A pattern of behaviour are reviewed in greater detail.

CHAPTER THREE

3.1 Introduction

This chapter reviews published and unpublished studies concerning general psychological aspects of the Coronary-prone Behaviour Pattern (CPBP). Most of the early research into the CPBP concerned its importance as a risk factor for coronary heart disease, its identification, and aetiology. Descriptions of Type A behaviour tended to be rather vague when much of this research was carried out. Thus of the research reviewed in this chapter was carried out in an attempt to clarify the nature of this pattern of behaviour and its relationship to other, better identified, personality traits and behavioural dimensions.

The concept of a behaviour pattern which had strongly suspected pathological consequences, has attracted the attention and imagination of researchers with disparate interests. Perhaps part of the interest in this pattern of behaviour has been generated by the fact that investigations of the possibility that various demographic characteristics and personality traits might be associated with adverse effects on the human cardiovascular system have generally produced weak and confusing effects.

3.1.1 Possible Social Risk Factors for CHD Development

There have been a great number and variety of investigations into the ways in which demographic and social factors may be associated with increased risk of CDH development. These studies have, for the most part, yielded inconsistent and confusing results (see Marks, 1967; and Jenkins, 1976 for detailed reviews). This is typified by studies of social class and CHD incidence. Early studies (eg. Logan, 1952) indicated that CHD was more prevalent in the higher social classes than it was in the lower social classes. However later investigations have shown CHD to be more prevalent in the lower social classes (eg. Marmot, Syme, Kagan, et al, 1975). Such variable results from studies of social status and CHD incidence may be due to a variety of factors such as CHD sufferers being unlikely to be able to attain or maintain high social status.

There is some evidence that the relationships reported between social status and CHD may in fact be accounted for by underlying educational differences. Data from the Western Collaborative Group Study (Rosenman et al, 1975) indicated that college graduates (aged 50-59) had significantly lower rates of CHD than their non-graduated age-mates. There have, however, been failures to find such a relationship in other studies (eg. Szlko, Tonascia and Gardis, 1976). Similarly inconsistent results have tended to emerge from investigations of the possible association between social cohesiveness and reduced rates of CHD. A number of studies have provided support for the hypothesis that social cohesiveness acts as a buffer against CHD development (eg. Marmot and Syme, 1976; Bruhn, Wolf, Lynn, et al, 1968; Stout, Morrow, Brandt, and Wolf, 1964). Other studies, however, have failed to yield support for this hypothesis (eg. Hinkle, Whitney, Lehman, et al, 1968; Haynes, et al, 1978).

3.1.2 Personality Characteristics Associated with CHD Risk

A large number of studies have sought to identify associations between CHD incidence and various personality characteristics. Although relationships between CHD and neuroticism and anxiety have been reported (eg. Bengtsson, Hallstrom and Tibblin, 1973; Thiel, Parker and Bruce, 1973), there have been failures to support the existence of such a relationship (eg. Wardwell and Bahnson, 1973; Blumenthal, 1979). Many studies in this area have been of retrospective design (some of the problems with retrospective designs were discussed in section 2.3), however, and it is difficult to determine whether the reported personality traits were precursors to the development of CHD or consequences of its diagnosis. There is no doubt that the diagnosis of heart disease has a great impact on victims (see Garrity, 1981 for an exhaustive review of the psychological impact of clinical CHD). This impact may precipitate the kinds of personality traits which have been observed in retrospective studies. The few prospective studies of CHD incidence and personality traits which have been carried out have also produced inconsistent results. A large study by Floderus (1974) indicated a possible association between angina pectoris and neurosis but no relationship was found between infarction and neurosis in a prospective study by Goldbourt, Medalie and Neufeld (1975).

Given the inconsistencies in this research into social factors and personality traits associated with CHD incidence, it is not surprising that many researchers became interested in the concept of a specific, identifiable pattern of behaviours being associated with increased CHD incidence. Much research concerning Type A behaviour appear to have been motivated just as much by an interest in the nature of this behaviour pattern as by interest in its association with CHD.

Thus the following review attempts to tie together and impose some structure upon a variety of studies carried out by researchers with different backgrounds who employed a variety of methodological approaches. An attempt is made to provide criticism of research when it appears that methodological flaws may have led researchers to make erroneous or unproven conclusions from their data. This review does not attempt to criticise the methods employed in differing studies to classify Type A and B subjects. As suggested in the previous chapter (2.5), many researchers have not had access to the preferred methods for Type A behavioural assessment (eg. the SI). Studies are, however, given weight in section summaries according to adequacy of the assessment methods and general methodology which has been employed.

3.2 Personality Correlates of the CPBP

A number of studies have been carried out to investigate the nature and extent of relationships between the Coronary Prone Behaviour Pattern (CPBP) and other personality characteristics and dimensions. In particular researchers have tended to be interested in the personal adjustments of Type A and B individuals. A variety of different approaches have been employed, tending to make this area of research disjointed and making an overall interpretation of the following studies difficult.

Dimsdale, Hackett, Hutter, Block and Catanzano (1978) carried out a study aimed at determining the relationship between the CPBP and a number of emotional factors thought to be associated with increased incidence of illness. Ninety-nine men and 10 women in the age range of 18-70 years (mean=49) with presumed coronary artery disease were subjected to a number of self-report and interview measures. These included the JAS (form B-Jenkins et al, 1967), the Hackett-Cassem interview for denial (Hackett and Cassem, 1974), a Schedule of Recent Events (Rahe, et al, 1974), and the Profile of Mood States (McNair, Lorr and Droppelman, 1971).

Type A behaviour was found to be significantly correlated with number of stressful life events ($r=0.26$, $p<0.01$) and current tension level ($r=0.28$, $p<0.005$). Lower correlations were found between Type A behaviour and depressive mood ($r=0.18$, $p<0.008$) and anger ($r=0.19$, $p<0.007$). None of these correlations are large, especially as tension and anger might be expected theoretically to correlate quite well with Type A behaviour.

The correlations between Type A behaviour, life events and depression found in this study are consistent with data reported by Byrne (1981). From a study of 120 survivors of myocardial infarction (93 males and 27 females) Byrne found a significant correlation ($r=-0.32$, $p<0.001$) between the Vickers Type A scale (Vickers, 1973) and number of life events reported (on a life events scale developed by Tennant and Andrews, 1976). He also found that Type A behaviour correlated significantly ($r=-0.35$, $p<0.001$) with the perceived emotional impact of life events (using a procedure reported by Byrne and Whyte, 1980). From his data and those reported by Dimsdale et al (1978) Byrne concludes that Type A individuals are more likely than their Type B counterparts to report significant life events and to experience these events as being noxious. Byrne tentatively hypothesizes that Type A persons may structure their lives in such a fashion as to ensure that they encounter more life events than Type B persons but believes that this hypothesis is simplistic, requiring support from more extensive prospective investigation(s).

There are possible shortcomings in both of the previous studies. Byrne entertains quite reasonable doubts about his retrospective design and the use of the Vickers Type A scale (doubts about this scale are discussed in chapter 5.4). The study by Dimsdale _et al_ can be criticised for the sample of subjects employed. Subjects were coronary patients awaiting cardiac catheterization at a large general hospital. Although Dimsdale _et al_ express the belief that Type A and B subjects would be affected in similar fashion by the prospect of this procedure, this may not be the case. In a later section of this chapter (3.5) a number of experiments are reviewed which indicate that Type A individuals are habitually more concerned with controlling their environment than Type B individuals. Thus Type A subjects are likely to perceive their coronary artery disease as a more important event, and the catheterization procedure as more threatening and depressing than Type B subjects. Despite these problems, these two studies suggest that investigation of the way in which Type A and B individuals experience life events is an area worthy of further investigation. It appears reasonable to suggest that Type A individuals do tend to experience more stressful events than Type B individuals and that this relationship may partly mediate the relationship between Type A behaviour and CHD.

A number of studies appear to have been run without the specific aims of the previous two investigations.

Rather than being driven by theory such studies appear to have been carried out with the general aim of discovering personality dimension which correlate with the Type A pattern. Smith and Brehm (1981) had 77 female and 72 male university undergraduate students complete the JAS (form T; Glass, 1977b), the Thurstone Temperament Survey (Thurstone, 1953), the Self-Consciousness Scale (Fenigstein, Scheier and Buss, 1975) and the Irrational Beliefs test (Jones, 1969) in groups of about 20. Subjects' JAS scores were found to correlate negatively with problem avoidance ($r=-0.41$, $p<0.001$), negatively with social anxiety ($r=-0.22$, $p<0.01$) and positively with "anxious overconcern" about future events ($r=0.18$, $p<0.05$). When subjects were separated by sex, for males JAS scores correlated with achievement motivation ($r=0.24$, $p<0.05$) and female's JAS scores correlated significantly with reactivity to frustration ($r=0.24$, $p<0.05$), with private self-consciousness ($r=0.23$, $p<0.05$) and negatively with emotional irresponsibility ($r=-0.20$, $p<0.05$).

From these correlational data there is some evidence that Type A subjects are predisposed towards active coping and mastery (direct experimental support for this notion is reviewed later in section 3.5 of this chapter). Only the negative correlation between JAS Type A score and problem avoidance could really be classed as accounting for a meaningful amount of common variance between measures, however. The other correlations reported are generally low and quite predictably characteristic of Type A behaviour. The correlation between JAS score and private self-awareness for the female sample is interesting and is discussed further in section 3.8 of this chapter.

In a similar study Chesney, Black, Chadwick and Rosenman (1981) carried out a very comprehensive investigation of the correlates of Type A behavior in a sample of 384 employed adult male subjects (mean age=47.5 years). Subjects were classified as either Type A or B using the structured interview (Rosenman, 1978) and were also required to complete the Adjective Checklist (Gough and Heilbrun, 1965), the Eysenck Personality Inventory (Eysenck and Eysenck, 1968), the Symptom Distress Checklist (Derogitas, 1977) the State-Trait Anxiety Inventory (Spielberger et al, 1970) and the Barratt Impulsiveness Scale (Barratt, 1965).

Type A subjects were found to exhibit significantly more aggression, autonomy, exhibition, self-confidence and dominance than Type B subjects on the adjective checklist, while Type B subjects showed significantly more self-control, deference, abasement, and counselling readiness than Type A subjects. Type A subjects were also found to be significantly more extroverted and impulsive than Type B subjects. Most of the adjectives by which Type A and B subjects were found to characterize themselves in this study tend to do little more than support the descriptions already available (discussed in chapter 2.2). It is interesting that Type A subjects were found to be more impulsive than Type B subjects. This finding goes against data reported by Innes (1980) from a smaller study and both results are discussed later in this chapter (section 3.3).

In a much smaller study Irvine, Lyle and Allon (1982) had 18 male and 19 female employed adult subjects complete the JAS (weighted scoring system-Jenkins, 1979), the Eysenck Personality Inventory, the Personal Deviance Scale (Foulds and Bedford, 1977), and Smith's Need Achievement Scale (Smith, 1973). JAS Type A scale score was found to correlate significantly with neuroticism ($r=0.38$, $p<0.05$), with dominance ($r=0.37$, $p<0.05$) and with extra-punitiveness ($r=0.36$, $p<0.05$). The correlations between the Type A scale, dominance and extra-punitiveness are, once again, quite characteristic of what might be expected for Type A individuals. These correlations are consistent with data reported by Van Egeren (1979b) who found that Type A subjects expressed dominance and were antisocial and threatening during a mixed motive game (this study is reviewed in much greater detail in section 3.4). The correlation between Type A behaviour and neuroticism is believed by Irvine et al to be produced by Type A individuals being more anxious than Type B individuals due to the greater demands which they operate under. Although this effect was not found in data from the larger study by Chesney et al (already reviewed) however, some support for the notion of a relationship between Type A behaviour and neuroticism has been reported from another study.

Waldron, McPherson, Butensky, Gruss, Overall, Schmader and Wohlmuth (1980) had 28 female and 30 male undergraduate university students complete the JAS (form N-Jenkins et al, 1975), the Eysenck Personality Inventory, and a form of Allport's Test for Ascendance-Submission (Allport, 1928). They found general evidence for a time-pressured lifestyle and generalized anger being associated with Type A behaviour in their female sample, but not in their male sample. In particular they found a significant correlation between JAS score and neuroticism ($r=0.46$, $p<0.05$) for their female but not for their male sample.

This study tends to suggest that Type A females are less well psychologically adjusted than their male counterparts. This finding might tend to be expected as the characteristic competitiveness, aggression and hostility observed in Type A individuals (eg. Rosenman, 1978) would generally seem to be much more socially acceptable when exhibited by males than females. De Gregorio and Carver (1980) have in fact suggested that, as Type A behavioural characteristics are more appropriate for males than females, Type A females tend to suffer difficulties in their sex role adjustment.

De Gregorio and Carver had 312 undergraduate university students complete the JAS (form T), the Bem Sex Role Inventory (Bem, 1974) and a package of questionnaires dealing with psychological adjustment. Subjects who scored in the middle one third of the distribution on the JAS were excluded from the analysis, resulting in a sample of 105 male and 108 female subjects. A significant interaction was found between subject's typology (A or B) and and whether they scored above or below the median for masculinity on the sex role inventory. Type A subjects tended to fall into the high masculinity category while Type B subjects tended to fall into the low masculinity category. Despite this significant interaction effect, the actual correlation between Type A score and masculinity for the whole sample was low ($r=0.16$, $n=317$, $p<0.01$).

De Gregorio and Carver also found generally poorer psychological adjustment amongst female Type A subjects. They found that female Type A subjects who were low in masculinity had significantly higher social anxiety (Self-consciousness Scale) than those who were high in masculinity, whereas no such difference was found for Type B females. A higher percentage of low masculinity Type A women were found to be depressed (Beck Depression Scale-Beck, 1967) than high masculinity Type A women, although once again there were no significant differences between high and low masculinity Type B women.

De Gregorio and Carver believe that Type A women who are low in masculinity tend to show poorer psychological adjustment as Type A behavioural characteristics are generally seen as more masculine. Although no other data on psychological adjustment have been reported, Grimm and Yarnold (1982a) have reported a relationship between Type A behaviour and masculinity. They had 85 female and 96 male undergraduate university students complete the JAS (form T) and the Bem Sex Role Inventory. Only subjects who scored one standard deviation or greater, extreme from the sample mean (leading to a final sample of 12 Type A and 22 Type B females and 21 Type A and 19 Type B males), had their data included in step-wise regression analyses.

The Type A/B behavioural dimension was found to be the sole predictor of masculinity (acounting for 47% of the variance). Sex was the main predictor of feminity however (accounting for 30% of the variance), with the Type A/B dimension failing to account for a significant proportion of the variance (2%). Thus Type A behaviour appears to be closely related to a masculine sex-role orientation. There is also evidence to suggest that those who are low in masculinity may suffer some conflict between this and their Type A behaviour which may, in turn, lead to problems in psychological adjustment.

The studies reviewed in the preceding section of this chapter do not integrate well, mainly due to the diversity of personality measures which have been employed. Although some studies do appear to have been designed with reference to some theoretical framework, others appear to represent the attempt of investigators to "fish" for significant correlations. Thus it has been necessary to force a structure on to the reviewed studies rather than to fit them into an existing theoretical system. The structuring of this section could not take into account variations in subject samples. Such variations may obviously reduce the impact and interpretability of some findings. For example, it is necessary to investigate the psychological adjustment of Type A females older and younger than the university students who took part in the two studies reported here. The poor adjustment found for Type A females in these two studies may have been produced or exacerbated by their age (post-adolescent) or by some difficulty in adjusting to a new environment (university) not shared by the males in the samples.

The extensive use of pencil and paper instruments in these studies is also problematic in the light of the evidence (reviewed in chapter 2.5) that Type A individuals respond poorly to such methods of assessment. The studies reviewed here did not generally produce much new and exciting information about the Type A pattern of behaviour. The relationship between Type A behaviour and life events and poor adjustment in females, however, are obviously worthy of further investigation.

3.3 Time Urgency

Unlike the previously reviewed studies which often appeared to lack a sound theoretical basis for their design, the following studies have all been designed to assess a basic characteristic of the Type A pattern. Starting with the work of Rosenman and Friedman (1959) and Friedman and Rosenman (1974), time urgency has been regarded as one of the basic cornerstones of the Type A pattern. Much of the evidence for the importance of this characteristic, however, was rather informal (see Friedman and Rosenman, 1974). A number of studies have been carried out to assess the extent to which time urgency is basic to the Type A pattern and to determine how it is manifested by Type A individuals.

It is important to note that most of the studies which are dealt with in the following review have sought to operationalize time urgency in either laboratory or field settings whereas studies in the last section used psychometric "paper and pencil" techniques of assessment. This distinction becomes especially important in dealing with methodological faults. Initial empirical evidence for a strong sense of time consciousness or urgency being associated with Type A behaviour, came from a study carried out by Bortner and Rosenman (1967). These researchers included various behavioural tests of time urgency in a battery of measures which they formulated to serve as an instrument for Type A behavioural assessment. Bortner and Rosenman found subjects' (76 adult males) writing speed and their estimation of one minute elapsed time (over 5 trials) were significantly related to their scores on the structured interview.

Requiring subjects to judge the passage of one minute has been used as a test of time urgency in other studies. Burnham, Pennebaker and Glass (1975) used this test in a study of time urgency in 62 male and female university undergraduates. Subjects who scored above the group median on the JAS (form T) were classed as Type A and those who scored below the median, as Type B. Burnham _et al_ found that Type A subjects signalled the passage of one minute significantly sooner than Type B subjects.

Data have also been reported which indicate that the time urgency manifested by Type A subjects can impair their performance on tasks which require a low response rate. Glass, Snyder and Hollis (1974) randomly selected 18 Type A subjects, who had JAS (form T) scores in the upper one third and 18 Type B subjects who scored in the lower one third, from a sample of several hundred male university undergraduates. These subjects worked on a task which required them to respond at 20 second intervals to gain a 2 cent reward per trial. If they responded before the 20 seconds had elapsed or after 25 seconds, they lost 2 cents and had to wait the next 20 second interval before responding. Subjects were told that they had to "figure out" the time interval which the task required them to respond at. Each was given an opening bank of 50 cents and worked on the task for 45 minutes.

Glass et al found that Type A subjects received a significantly lower percentage of reinforcements than Type B subjects. Type A subjects were also found to manifest significantly more behavioural signs of tension and hyperactivity during the task than Type B subjects. Glass et al believe that the time urgent nature of the Type A subjects conflicted with the slow response rate required on the task. This notion is supported by the results of the post experimental questionnaire, in which Type A subjects rated the task as more difficult than Type B subjects. The pattern of errors data also tended to indicate that Type A subjects found it difficult to wait the required 20 seconds despite the fact that they were able to estimate accurately (post-experimentally) the time interval involved.

The first of two studies carried out by Grimm and Yarnold (1982b) supplies further evidence for the association between time urgency and Type A behaviour. In the first experiment, 22 female undergraduate university students were asked to read aloud from a technical paper while they attempted to judge one minute elapsed time. Subjects who scored above the median on the JAS (form T) were classed as Type A and those who scored below the median as Type B. Type A subjects signalled the passage of one minute significantly earlier (mean=61.4 seconds) than Type B subjects (mean=77.2 seconds).

The time urgency associated with Type A behaviour has also been found to be manifested in extreme punctuality. Gastorf (1980) selected 120 male and 120 female subjects from a sample of 450 undergraduate university students by their scores on the JAS (form T). Those who scored more than one standard deviation above the mean were classed as Type A and those who scored less than one standard deviation below the mean, as Type B. Gastorf found that Type A subjects arrived significantly earlier than Type B subjects for an experiment. Strahan (1981) points out, however, that the effect strength was very low in Gastorf's experiment. From a reanalysis of Gastorf's data, Strahan reports that the actual correlation between JAS score and arrival time for the experiment, was very low (r=0.13). Therefore, while Gastorf's data suggest that Type A subjects are more punctual than Type B subjects, very little can be made of such a small effect.

A similar study of Type A behaviour and punctuality was carried out by Strube (1982). 50 male and 48 female university undergraduates were asked to participate in a questionnaire study when it was convenient to them. Strube found that subjects' scores on the A/B subscale of the JAS (form T) correlated significantly with the time they chose to participate in the study (r=-0.36). Type A subjects tended to participate earlier than Type B subjects.

The problems of generalizing from laboratory studies of awareness of the passage of time to field investigations of the same concept can be seen in the study by Lee and Innes (1983) who reported data from an investigation of Type A behaviour and punctuality which failed to replicate previous results. Eleven Subjects were designated Type A as they scored a half standard deviation, or greater, than the mean JAS (form T) score for a sample of 240 male and female university undergraduates. 17 Subjects who scored half a standard deviation, or less, than the sample mean were classed as Type B and the remaining 25 subjects were classed as average. Lee and Innes found that Type A and B subjects did not differ significantly in their arrival time for an experiment, with both Types tending to arrive late. Type A and B subjects did differ significantly from the average subjects who tended to arrive early.

Thus, unlike previous studies, Lee and Innes did not find a linear relationship between Type A behaviour and time of arrival. They believe that the lateness of arrival of Type B subjects may be due to their relative lack of time consciousness, whereas Type A subjects may tend to be late due to their greater workload placing more constraints on their time. Thus it cannot be presumed that Type A individuals will always be earlier in arriving for appointments as their punctuality may well depend on situational constraints as well as dispositional factors. Without additional measures of workload, among other things, unequivocal predictions about the punctuality of A and B Type individuals must be made with extreme care.

In another experiment, Grimm and Yarnold (1982b) had 80 male and 32 female university undergraduates complete a package of questionnaires (including JAS form T) in groups of 10-30. Subjects were classed as fast if they finished in the first half and slow if they finished in the second half of their test group. Subjects were designated as either Type A or B by a median split of their JAS scores, with those who scored on the median being included with the Type A subjects. A significant relationship between subject Type and classification as fast or slow was found. Grimm and Yarnold propose that Type A individuals tend to set high standards for themselves (evidence for this is reviewed in section 3.6 of this chapter) in terms of quantity that they must produce and that they are forced to work fast in their attempts to achieve this standard.

This hypothesis is given more weight by the proposal by Friedman _et al_ (1981) that Type A individuals tend to respond superficially to questionnaires as they see consider them to be boring and a waste of time (this proposal was mentioned in chapter 2.5). In the light of this hypothesis it is possible that their interest in speed of performance may lead Type A persons to engage in a less detailed sampling of events upon which to base their responses to questionnaire items. In responding quickly and superficially to questionnaires Type A subjects may give the appearance of being low in dispositional self-awareness and self-monitoring (evidence that Type A individuals are less self-aware in demanding situations is reviewed in section 3.8 of this chapter). They may also have generally less reliable scores on personality measures as it is possible that the personality profile of A Type individuals may be, at least in part, situationally based.

There is evidence that the time urgency of Type A individuals is not strongly related to any underlying personality dimension. Researchers have tended to concentrate on investigating the relationship, intuitively to be expected, between Type A behaviour and impulsivity. Blumenthal, McKee, Williams, and Haney (1981) tested 65 female and 61 male university undergraduates for impulsivity using the Matching Familiar Figures Test (Kagan _et al_, 1964) but found no relationship with the Type A/B behavioural dimension as assessed by either structured interview or JAS (form B-Jenkins _et al_, 1971). They did find a significant effect for the JAS speed and impatience measure and the impulsivity of the female subjects. This effect, however, does not clarify the nature of any relationship which may exist between the overall Type A pattern of behaviour and impulsiveness.

Rather than being more impulsive than their Type B counterparts, as might be intuitively expected, there is evidence for the existence of a more complex relationship. Innes (1980) carried out a study on 56 male and female university undergraduates. He found that the Vickers short measure of Type A behaviour (Caplan, Cobb and French, 1975) correlated positively ($r=0.29$, $p<0.05$) with the "non-planning" component of the Eysenck Impulsivity Scale (Eysenck and Eysenck, 1977) but correlated negatively with the "risk-taking" subscale ($r=-0.31$, $p<0.05$). He did not find a significant correlation between the Type A measure and the overall "broad impulsivity" scale however. Obviously these data suggest that Type A individuals tend to avoid risk taking, perhaps in the interests of performing with few errors, but also tend to avoid planning ahead. These data are in accord with the proposal by Price and Clarke (1978) that Type A individuals might value quality as well as productivity in some situations, thus appearing to be less impulsive than Type B individuals.

The effects reported by Innes (1980) are not strong and are not supported by data from the study (reviewed in the last section) by Chesney et al (1980-reviewed in the preceding section of this chapter) who found a positive correlation between Type A behaviour (as assessed by structured interview), and a different impulsiveness scale (for a large sample of middle aged men). The scale employed by Chesney et al did not assess components of impulsivity, however, and thus the effect found may be a function of the weighting of this scale or some aspect of the situation in which the subjects answered the questionnaire. Data have been reported which provide further support for the notion that impulsiveness in

Type A individuals may be mediated situationally rather than dispositionally.

Price and Clarke (1978) selected 24 Type A and 24 Type B male university undergraduates from a group of 200 by their extreme scores on the Bortner Type A scale (Bortner, 1969). Subjects were asked to signal the passage of 12, 60, 90, 110, and 135 second time periods. They found, in accord with previous studies, that Type A subjects consistently produced lower estimations of elapsed time than Type B subjects, but that this difference was only significant for the 135 second estimation. In a second experiment, Price and Clarke found that Type A subjects were significantly slower to solve mathematical problems than Type B subjects. This effect was also found when the subjects were ranked by their JAS (form T) score. Type A subjects were found to be significantly slower than Type B subjects to react to an insoluble mathematics problem presented as part of the soluble task. Price and Clarke take the data from their second experiment as supporting their notion that Type A individuals may be interested in the quality of their work in some situations thus tending to respond less impulsively than Type B individuals.

In conclusion there is ample evidence that Type A individuals experience time as passing more rapidly than Type B individuals. It is also interesting to note, however, that in two of the reviewed studies, the Type A subjects were more accurate (nonsignificantly) in their judgement of the passage of one minute, than Type B subjects (Price and Clarke, 1978; Grimm and Yarnold, 1982b). Type A individuals also tend to be more punctual than their Type B counterparts although this punctuality may be situationally constrained. Type A individuals have some difficulty in responding slowly when their situation requires it. Thus Type A individuals do appear to possess an empirically verifiable, sense of "time urgency".

The relationship between Type A behaviour and impulsivity is complex, however, offering no evidence that the time urgency of these individuals is related to impulsivity. Rather it appears that the degree of impulsivity displayed by Type A individuals is determined, to some degree, by their situation. Interpretation of the impulsivity data must be very tentative in the light of two main areas in which the studies reviewed here have methodological flaws. Firstly, the variety of impulsivity measures employed makes it impossible to equate the studies and produce a meaningful conclusion from the available data. This is especially so given that the only study to look at components of impulsivity (Innes, 1980), used one of the least well proven of the available Type A measures (instruments for assessment of Type A behaviour were reviewed in chapter 2.5). Data which tend to indicate the validity of the Vickers scale are reported later in this thesis however (chapter 5). Despite this evidence, conclusions about the effect of their situation on the way in which Type A individuals manifest time urgency and impulsivity, must necessarily be be tentative.

There is a possibility that the time urgency, displayed by Type A persons, may arise out of the fact that their performance appears to be slower than that of Type B individuals. Data from studies reviewed here tend to indicate that Type A subjects possess slower reaction times than Type B subjects, they also tend to be slower at cognitive performance tasks. A study by Abrahams and Birren (1973) may also provide some support for this notion. Subjects were 48, 25-59 year old male civil service employees who showed no signs of clinical CHD. Type A behavioural classification was made by use of the structured interview and subjects were only included in the study if two trained raters agreed on their typology. Abrahams and Birren found that Type A subjects had significantly slower response latencies on both a simple and a choice reaction time task, than Type B subjects.

If their reactions and cognitive processes are in fact slower than those of Type B individuals, Type A individuals may well find themselves at a disadvantage in competition which requires rapid responding. This slower responding may help to induce the feelings of inferiority early in life, which Friedman, Thoresen and Gill (1981) have proposed may underly the development of a Type A pattern of behaviour. They may also help to make Type A individuals adopt a time urgent approach in order to keep up. This very tentative hypothesis pieces together some of the available data and therefore de-serves investigation. If Type A individuals do tend to suffer cognitive deficits, this may also help to explain the evidence for their competitive and aggressive behaviour, especially to demanding situations in which they must perform. Studies providing evidence for this competitiveness and aggression are reviewed in the next section of this chapter.

Time urgency, or speed and impatience, may also be related to other psychological coping devices. Vickers, Hervig, Rahe and Rosenman (1981) found that the speed and impatience component of the JAS was related to a high defensiveness coping mechanism, as measured by items from the California Psychological Inventory (CPI). The relationship between the Type A pattern and other behaviours may reflect the defence mechanisms that individuals have learned over time. Hansson, Hogan, Johnson and Schroeder (1983) have also recently shown that a "driven-ness" component, related to impatience, is associated with particular coping styles, especially in relation to anxiety.

3.4 Competition and Aggression

As with time urgency, competitiveness was originally rather informally identified as a component of the Type A pattern of behaviour by Rosenman and Friedman (1959). Since that time the tendency of Type A individuals to manifest competitive and aggressive behaviours has been well documented. A number of laboratory studies of competitiveness and aggression have assessed physiological as well as psychological indices of competitiveness. Some of these physiological studies have been mentioned in chapter 2. The psychological aspects of these studies will be emphasized here, although physiological data are also dealt with.

Friedman, Byers, Diamant and Rosenman (1975) carried out a study to compare the responses of 30 healthy men, designated as either Type A (n=15) or Type B (n=15) by use of the structured interview, to a competitive situation. These men were required to compete with each other (in pairs) to solve an essentially insoluble task, with the first in each pair to solve the task winning a bottle of wine. Loud rock music on two different radio stations was played during the task to distract and annoy subjects.

Friedman *et al* reported mainly physiological data from this study. They found that Type A subjects had significantly higher plasma norepinephrine levels before, during and after the competition than Type B subjects. The norepinephrine levels of Type A and B subjects did not differ significantly when measured in a non-competitive (control) situation a week later. Friedman *et al* interpret these data as indicating that the Type A subjects were more stressed by anticipation of, and performance in the task, than Type B subjects. They informally observed a much more competitive and aggressive demeanour amongst Type A subjects during and after the task. Type A subjects were also found to be generally disgruntled when debriefed about the true nature of the experiment, whereas Type B subjects tended to be slightly amused. These informal observations constitute the only real evidence from this study for competitiveness and aggression being associated with Type A behaviour. While the physiological data are impressive, there is no compelling evidence that they are due to competitiveness or aggressiveness, and not directly due to drive effects induced by the distraction manipulation.

Van Egeren (1979a) carried out a study in which university students were required to compete on a mixed motive "prisoner's dilemma" style game (see Eiser, 1980, pp. 200-215 for a description of prisoner's dilemma games). Sixteen female and 16 male subjects played the game through a response board and video screen link, with an experimenter's confederate. After the experiment all subjects completed the JAS (form T). Van Egeren found that subjects' JAS scores were significantly correlated with their heart rate when the results of game trials were displayed. Type A subjects tended to manifest larger increases in heart rate than Type B subjects. These data can only be interpreted as indicating that Type A subjects may have been more competitive and aggressive than Type B subjects with reference to a similar study by Van Egeren which is discussed below.

Van Egeren (1979b) carried out an experiment using 30 male and 30 female subjects selected as those who had the most extreme JAS (form T) scores of a group of 200 university students. Pairs of subjects took part in a mixed motive game which allowed them to cooperate, compete, punish, reward or withdraw on each trial. Van Egeren found when comparing dyads of Type A subjects with dyads of Type B subjects that Type A subjects showed significantly less trust than Type B subjects. Type B subjects were more conciliatory and gained twice as many points as Type A subjects. Type A subjects, however, were found to be significantly more trusting and cooperative when they interacted with Type B subjects than when they interacted with other Type A subjects. Type B subjects tended to be trusting and cooperative whether interacting with Type A or Type B subjects.

These findings are interesting in that they are not in accord with theory about subject's perceptions of the other's intentions in prisoner's dilemma games. Kelly and Stahelski (1970) have presented data to support their hypothesis that competitive individuals (the orientation which Type A individuals are believed to possess) generally tend to perceive their partner's as also being competitive. In the previous evperiment Type A subjects appeared to be responsive that Type B partners were less competitive. Later in this thesis (chapters 8 and 9) data are presented which indicate that Type A subjects may be more responsive to their social environment than Type B subjects. Van Egeren's data offer some support for the notion that Type A individuals are socially responsive. It is interesting to note that Hansson et al (1983) have recently shown that the impatience component of the JAS may be related to social imperceptiveness. So the possibility exists that Type A individuals may be socially responsive, if they are less impatient although other components of their Type A pattern of behaviour may continue to be present.

In the previous experiment by Van Egeren (1979b) subjects could also send a variety of set messages to each other through the communications system used for the game. Van Egeren found that Type A subjects sent significantly more competitive and antisocial messages or threats to other Type A subjects than Type B subjects sent to other Type B subjects. In these dyads Type A subjects also refused significantly more messages. Type A subjects expressed significantly more dominance and rivalry in their messages than Type B subjects. When interacting with Type B subjects, Type A subjects were significantly less likely than other Type B subjects to satisfy a prosocial (eg. please reward or cooperate) message. Thus Type A subjects appear to have been aggressive and competitive in this laboratory situation, in comparison to Type B subjects (see footnote).

Footnote: Van Egeren also collected finger-pulse amplitude data from subjects while they were involved in this experiment. He found that Type A subjects manifested significantly greater finger-pulse amplitude before the task and significantly less decrease on this measure in the outcome period of the task than Type B subjects. He interprets these data as indicating that the Type A subjects were more stressed and aroused by the task than Type B subjects. There was, however, a complete failure to replicate these results in a subsequent experiment.

An attempt to replicate the previous experiment was carried out by Van Egeren, Sniderman and Roggelin (1982). Twenty Type A and 20 Type B university students were chosen as they had the most extreme scores on the JAS (form T) of a group of 412. This study essentially replicated the previous one, finding once more that Type A subjects were more aggressive and competitive than Type B subjects.

Thus there is ample evidence from these laboratory studies than Type A individuals are more competitive and aggressive than Type B individuals. Friedman _et al_ (1981) suggest the possibility that this competitive , aggressiveness is manifested by Type A individuals due to some insecurity, and Vickers _et al_ (1981) "hard-driving" Type A individuals to have poor coping skills. Some supporting data have been reported. Gastorf and Teevan (1980) have reported that Type A subjects show a greater fear of failure than Type B subjects. Twenty-seven subjects who had JAS (form T) scores one standard deviation greater than the mean of a larger group of male university undergraduates were classed as Type A. Twenty-one subjects with scores of one standard deviation or less than the sample mean were classed as Type B. All subjects completed Thematic Apperception Test (TAT) protocols which were scored to yield an index of fear of failure (see Birney _et al_, 1969). Type A subjects were found to have significantly higher fear of failure scores than Type B subjects. Thus Type A individuals may adopt their competitive approach in response to a fear of failing.

There are indications from the data reported here that competitiveness may be directly related to greater cardiovascular reactivity amongst Type A individuals (as discussed at much greater length in chapeter 2.7). It is possible, however, that the intrusive and artificial nature of these laboratory studies may have contributed in some way to the pattern of data reported in these studies. In a subsequent section of this chapter (section 3.5) studies which indicate that Type A individuals may be particularly stressed by the prospect of a loss of control are reviewed. Type A subjects may have felt their control was threatened in the laboratory studies reviewed here and this threat may have affected the reported patterns of behavioural and physiological data. The measurement of physiological indices of arousal may have been particularly affected in this fashion. Data have been reported from a field study which fail to provide any real evidence to support the notion that Type A individuals are more competitive and aggressive than their Type B counterparts in non-laboratory situations.

Stokols, Novoco, Stokols and Campbell (1978) carried out a study of the effects of traffic congestion on 69 male and 31 female industrial employees. Subjects completed the JAS, with those who scored above the sample median being classed as Type A and those who scored below the median being classed as Type B. Stokols et al found that Type A subjects travelled at significantly higher speed than Type B subjects, making their commuting of significantly less duration (there was no overall difference in the distance that Type A and B subjects had to travel). Physiological and self-reported stress levels data were also collected but failed to yield clear evidence of competitiveness or aggression being related to Type A behaviour. Subjects were assigned to low, medium and high impedance groups on the basis of the time and distance which were involved in commuting to and from their work. Lowest levels of frustration tolerance and highest systolic blood pressure were found in the Type B subjects in the high impedance group and to the middle impedance group of Type A subjects. Stokols et al fail to come up with any compelling explanation for this pattern of results which offer little evidence for competitiveness and aggression being characteristic of Type A individuals outside of the laboratory.

From the preceding studies it appears that it is relatively easy to elicit competitiveness and increases in cardiovascular arousal from Type A individuals in laboratory situations. The study by Stokols et al indicates the distinct possibility that A Type individuals are only competitive and aggressive in structured laboratory situations. It also appears that the cardiovascular arousal manifested by Type A subjects in competitive situations may be due to their competitive and aggressive nature but there is no conclusive proof of this link or that such arousal occurs outside of the laboratory.

3.4.1 Ability and competitiveness

In the previous section on time urgency and Type A behaviour, data were reported which indicated that the slower speed of their reactions may put Type A individuals at some disadvantage in their attempts to compete with others, thus forcing them to be more competitive. Two studies have been reported which tend to indicate that this competitiveness may pay off in enhancing the level of achievement of Type A individuals.

Becker and Suls (1982) had a class of 103 undergraduate university students complete the JAS (form T) which was then scored using the weighted scoring system to yield scores on the Type A, speed and impatience and hard-driving aggressiveness sub-scales. Subjects' scores on these subscales were then correlated with their scores and time spent on a 60 item multiple choice test which assessed knowledge of social psychology. A low correlation was found between the speed and impatience sub-scale and the time which subjects took to complete the test ($r=0.18$, $p<0.05$). Subjects scores on the hard-driving, aggressiveness scale correlated significantly with their performance on the test but this correlation, although better than the last, was also low ($r=0.28$, $p<0.002$). Becker and Suls propose that performance differences between Type A and Type B individuals may be difficult to find using global measures of Type A behaviour. Their data also tend to indicate that the hard driving competitiveness of Type A individuals may tend to facilitate their performance on a variety of tasks.

Matthews, Helmreich, Beane and Lucker (1980) have reported that Type A behaviour is related to academic achievement. Subjects were 118 male academics (with PhD.s) who returned completed questionnaire packages to the experimenters. They found Type A behaviour, as assessed by the JAS to be significantly correlated with subjects' scores on the mastery ($r=0.47$, $p<0.01$), competitiveness ($r=0.26$, $p<0.01$) and work ($r=0.27$, $p<0.01$) subscales of the Work and Family Orientation Scale (Helmreich and Spence, 1978). Type A behaviour was also significantly correlated with number of publications per year ($r=0.18$, $p<0.05$), although this correlation was low. Matthews et al also found that the frequency with which their subjects' work was cited by others was related to their scores on the Hard-driving, Aggressiveness subscale of the JAS. These researchers propose that hard-driving aggressiveness is helpful to these Type A academics in their work. No attempt was made in this study, however, to assess the quality of the work produced by these academics. Thus it is possible that Type A academics were producing more work but work which was of a lower quality that that of their Type B colleagues (the reverse situation is obviously also a possibility).

3.4.2 Direct evidence of aggressiveness

From the preceding studies there appears to be ample evidence that Type A individuals are competitive and hard-driving but aggressiveness has not been directly assessed in the studies reviewed so far. Data have been reported, however, which lend direct empirical support to the notion that Type A individuals are more aggressive in challenging, competitive situations than Type B individuals.

Carver and Glass (1978) carried out an experiment in which male undergraduate students were required to give electric shocks (supposedly) to another subject (really an experimenter's confederate) in what was called a "teaching experiment". 23 subjects who had JAS (form T) scores in the top one third of a larger sample were classified Type A and 25 subjects, who scored in the lower one third, were classified as Type B. Half of these subjects were put in an "instigation" (of aggression) condition where they had to complete a puzzle prior to the "experiment" while the confederate looked on and made prearranged competitive remarks about the subject's performance.

Carver and Glass found that the instigation condition had a significant effect on the mean intensity of shocks applied by subjects to the confederate during the "teaching" experiment. Subjects in the instigation condition gave shocks of significantly higher intensity and rated the confederate as significantly less likeable than subjects in the no instigation condition. In each case the effect was mainly due to the Type A subjects who were much more affected by the instigation condition than Type B subjects.

Glass, Krakoff, Contrada, Hilton, Kehoe, Mannucci, Collins, Snow and Elting (1980) carried out a similar experiment using adult employees of the New York City Transit Authority as subjects. 22 Type A and 22 Type B subjects were chosen from a larger sample using the structured interview. Subjects were also screened to ensure that their blood pressure and serum cholesterol levels were within the normal range, that they were not diabetics and, if they were smokers, that they smoked less than one packet of cigarettes per day. These subjects were required to compete at "super pong" (a video-simulated ping-pong type of game) with a highly trained experimenter's confederate. Subjects played a series of nine games against the confederate in either a "no harass" condition, where they did not communicate with the confederate, or in a "harass" condition in which the confederate made 21 prearranged competitive and denigrating remarks to them. The subjects played for the added incentive of a twenty-five dollar gift certificate although all lost the series of games to the confederate.

Glass et al found that harassed Type A subjects had significantly higher systolic blood pressure, greater heart rate elevation, and a greater elevation in plasma epinephrine during the task, than non-harassed Type A subjects or Type B subjects. This study tends to indicate that Type A individuals are more aroused than Type B individuals in an aggressively competitive situation but this arousal is really only attributable to aggressiveness with reference to the previous experiment.

In conclusion, there is evidence that the competitiveness of Type A individuals is particularly related to their increased risk of CHD. Matthews, Glass and Rosenman (1977) carried out a re-analysis of some data from the Western Collaborative Group Study (reviewed in chapter 2.3). This re-analysis showed that a factor which these researchers named "competitive drive" was most strongly (of all factors derived by a factor analysis) related to later onset of CHD. Studies by Williams et al (1980) and by Shekelle et al (1983) hostility with CHD were reviewed in chapter 2.4. Thus it appears that both the competitiveness and aggressive/hostility components of the Type A pattern of behaviour may be significantly related to increased risk of CHD development. Matthews et al (1977) have proposed that competitiveness is produced by the need of Type A individuals to gain mastery of, or control over, their environment. There is a large body of experimental evidence that Type A individuals generally exhibit a strong need to gain and maintain control of their surroundings and also some evidence that they tend to suffer learned helplessness effects if this need is not realized. Studies of Type A behaviour, control and helplessness are reviewed in the next section.

3.5 Control and Helplessness

3.5.1 Need for control and the CPBP

Early studies concerning the CPBP, time urgency and competitiveness led Glass (1977b) to propose that the Type A pattern of behaviour represented a style of coping for those who manifested it. Glass proposed that Type A behaviour represented the attempts of the individual to gain or maintain, actual or perceived control, especially in challenging, stressful situations. Glass observed that:

> "Pattern A behavior might thus be conceptualized as a characteristic style of responding to environmental stressors that threaten the individual's sense of control." (p.72).

Glass and various associates carried out a series of experiments designed to threaten the control of Type A and B individuals, in order to test this hypothesis.

The first of these experiments (Glass, 1977b, p. 73) involved use of a learned helplessness experimental procedure (see Seligman, 1975). Subjects were 40 university students who were classified as Type A if they scored above the group median and as Type B if they scored below the group median on the JAS (form T). Subjects were exposed to a pretreatment phase where half could escape a loud noise by an appropriate chain of lever pressing responses and the other half, although believing that they could escape, had their response board disconnected so that escape was not possible. The test phase of the experiment was a 47 trial choice reaction time task. A significant interaction of subject Type and escape/non escape condition was found for the reaction time data. Type A subjects performed better after exposure to uncontrollable noise while the reverse was the case for the Type B subjects. Glass concluded that, whereas Type B subjects tend to give up their attempts at mastery after uncontrollable noise, Type A subjects are more motivated by the fact that their sense of control has been threatened by their previous brief experience of uncontrollable noise and try harder to gain or maintain control.

In a second experiment (Glass, 1977b, p. 80), 45 male university undergraduates, classified as Type A or B in the same manner as the previous experiment, were asked to solve either soluble or insoluble problems in a pretreatment phase. Subjects were then required to perform on a task involving differential reinforcements of low response rates (the task described in the section on Time Urgency, as used by Glass, 1977b). A similar significant interaction to that found in the previous experiment was found for subject Type by soluble/insoluble pretreatment phase. Type A subjects received a higher percentage of reinforcements after insoluble pretreatment than after soluble pretreatment, whereas the reverse was the case for Type B subjects. Glass proposed from these data that, when challenged by the uncontrollable pretreatment, Type A subjects were motivated to slow their rate of responding in an attempt to regain mastery, just as they were motivated to respond more quickly in the previous experiment.

In another experiment (p. 87) Glass tested the hypothesis that schedules of partial reinforcement could be manipulated so as to vary perceived uncontrollability to subjects. Twenty Type A and 20 Type B male undergraduate students (classified in the same fashion as the last two experiments) pressed a button to earn five-cent pieces. Half of the subjects received reinforcement on a fixed ratio schedule of 5 button presses to each reinforcement while the other half were on a variable ratio which averaged five presses for each reinforcement. A replication of this experiment (p. 89) was run using 62 middle aged (40 to 50 years) employed male volunteers who were classified as Type A or B by the same method as used in the preceding experiments.

In both of these subject samples, Glass found that Type A subjects reached acquisition criterion (31 five-cent pieces) significantly more quickly than Type B subjects when they were on the variable ratio reinforcement schedule. He proposes that Type A subjects were more motivated in the variable ratio condition than their Type B counterparts as they experienced this reinforcement schedule as essentially uncontrollable. Thus these four experiments are seen by Glass as strongly supporting his hypothesis that Type A individuals are more motivated by perceived threats to their sense of mastery of their environment than are Type B individuals.

This first hypothesis proposed by Glass (1977b) has been supported by other researchers. Matthews (1979) carried out a study using a sample of 90 fourth and fifth grade boys and for a sample of 69 university undergraduate males. The adult subjects were classified as Type A or B by a median split of their scores on the JAS (form T). The boys were classified by their school teachers' ratings of them on a 7-item, Type A behaviours scale (e.g. Matthews and Angulo, 1980). Matthews had subjects push a button to receive five-cent pieces, either on a fixed ratio of 7 or on a variable ratio which averaged to a reinforcement for every 7 button presses. Salience of level of controllability was manipulated by varying lighting, with diffuse lighting in the low salience condition and lights focused on the experimental apparatus, which also flashed a red light when delivering reinforcements, in the high salience condition.

Matthews found that Type A boys and men made significantly greater efforts than Type B boys and men to assert control in the high salience conditions. She found no significant differences between Type A and B boys and men, however, in the low salience condition. Matthews believes, in line with the original theorizing by Glass (1977b), that Type A subjects tend to ignore evidence of their own lack of control when it is not made salient to them. She further proposes from these and other data reported by Matthews and Brunson (1979) that Type A individuals tend to ignore information peripheral to what they perceive to be the central or most important task at hand. This hypothesis is discussed in detail in the last section of this chapter concerning self-awareness and Type A behaviour.

Another approach to this area of research has been to employ methods similar to those used in the study of psychological reactance (Brehm, 1966). There appears to be a close parallel between the area of research on Type A behaviour presently under review and the literature on psychological reactance. Wortman and Brehm (1975) in reviewing the literature on reactance and learned helplessness proposed that both initial response to loss of choice or control (reactance) and learned helplessness effects were generally mediated by the individual's expectations of their level of control. Seligman (1975) has only concluded, however, that helplessness occurs when individuals perceive independence between their behaviour and their outcomes (see footnote).

Footnote: Later Abramson, Seligman and Teasdale (1978) reformulated learned helplessness theory to take the individual's expectations of control into account. They also suggested that people generally attribute their helplessness to a cause, and propose that such causes may stable or unstable, global or specific and internal or external. In a critique of this reformulation, Wortman and Dintzer (1978) suggest that, although Abramson *et al* have answered a number of questions about the original theory of learned helplessness, problems still exist with the theory. They believe that an important attributional dimension (which has some relevance to this thesis) overlooked by Abramson *et al* is that of controllability.

Nevertheless, the explanation provided by Wortman and Brehm (1975) does integrate both theories and fits with research already reviewed in this section. Type A individuals appear to have high expectations for their own control, responding to situations where their control is threatened with increased efforts to maintain it (as Wortman and Brehm would predict). A number of studies are reviewed below which have attempted to assess the extent of Type A individuals' need to control by determining their reactions to various reactance manipulations.

Carver (1980) carried out three laboratory experiments to investigate possible differences between Type A and B individuals in their responses to coercion in persuasive communications. In all three experiments subjects who had JAS (form T) scores in the top one third of a larger group of undergraduate university students were classed as Type A and those in the lower one third as Type B. In all of these experiments Carver had subjects read a persuasive communication which was either coercive or not coercive in tone. In the first experiment Carver found that Type A subjects perceived significantly more coercive intent in both messages than Type B subjects. This effect was mainly due to them perceiving coercive intent in the noncoercive message when Type B subjects did not.

In his second experiment Carver assessed actual attitude change in response to the communications. The only subjects who manifested a significant attitude change were the Type B subjects in the noncoercive condition. An analysis which included sex as an independent variable produced a confusing pattern of effects however, a result which Carver attributed to the lack of relevance which the topic had for females. Thus Carver ran a third experiment using only female subjects and a topic designed to be more relevant to them. Type B females changed their attitude significantly in both coercion conditions (although the effect was only significant when the data from both conditions were combined). Type A subjects showed a significant reversal effect, tending to be persuaded in the noncoercive condition but to resist changing their attitude in the coercion condition. Carver concludes from these data that Type A individuals are particularly sensitive to attempts to coerce them, seeing coercion as a threat to personal control which they resist strongly. Given the nature of these data Carver's conclusions are rather broad and general, but they are supported by data from other studies.

A similar study was carried out by Snyder and Frankel (1975) who presented subjects with a communication which sought to convince them that solar power was preferable to nuclear power as an alternative to oil. Ninety-one undergraduate male university students were selected from a larger group who completed the JAS (form T) if they scored in the top or bottom thirds of the distribution. Half of the subjects received a explicit persuasive communication, while the other half received this communication with embedded comments designed to coerce subjects towards the desired opinion. There was no significant difference between Type A and B subjects on a premeasure of their attitudes, but Type A subjects were found to show a significant attitude change against the communication on a postmeasure of their attitude, after receiving the coercive message. The coercive message had no significant reactance effect on Type B subjects.

Rhodewalt and Comer (1982) carried out an experiment which employed a choice elimination reactance paradigm (eg. Brehm, 1966). Type A and B subjects were chosen from those who scored in the upper and lower thirds of a group of about 300 university undergraduates on the JAS (form T). Twenty Type A and 20 Type B subjects were asked to make two ratings of the attractiveness of a series of five paintings in what they believed to be an experiment on the effects of subliminal stimulation. They were promised a reproduction of the painting which they liked the most for taking part in the experiment. Before they made their second series of ratings half of the subjects (elimination condition) were told that one of the reproductions (which they had rated third) was not available but that they could choose one of the remaining four.

Type A subjects were found to rate the eliminated choice as significantly more attractive at their second rating than at their first. Thus Type A subjects appear to respond to a loss of freedom of choice, which is effectively a loss of control, with reactance. Type B subjects did not show significant reactance effects in response to loss of choice. Thus Type A subjects were found to show significant reactance to attempts at eliminating some aspect of their freedom of choice in each of the preceding three experiments. These reactance experiments then offer some of the strongest available evidence for the importance of a sense of control to Type A individuals.

The hypothesis of the importance of control to Type A individuals, proposed by Glass, appears to be well supported by the research that has been reviewed thus far. Glass proposed a second hypothesis however. This hypothesis was that, although their initial reaction to threats to their control may represent extreme motivation to retain control, Type A subjects may react to prolonged exposure to uncontrollable situations with passivity more characteristic of a learned helplessness response.

3.5.2 Uncontrollability, helplessness and the CPBP

Krantz, Glass and Snyder (1974) ran an experiment to examine the relationship between stress level, control and helplessness in Type A individuals. In this experiment 60 male university students were classed as Type A or B according to a median split by their JAS (form T) scores. Subjects were exposed to a series of either moderate or loud bursts of noise during a pretreatment phase of the experiment, where half were able to escape the noise and half were not. In the test phase of the experiment all subjects were able to escape the noise bursts by learning the required response with a shuttle-box lever.

Whereas Type B subjects were found to perform about the same in the escape and no escape conditions, Type A subjects showed a significant decrease in escape responses in the high stress condition (loud noise). The opposite was the case in the low stress condition (moderate noise) where Type A subjects took significantly fewer trials to learn to escape than Type B subjects. From these data Krantz et al suggested that the need of Type A subjects to maintain control and their learned helplessness response when this was not possible, were mediated by the level of stress involved in the situation.

On the basis of this last experiment, Glass (1977b) proposed that the response of Type A individuals to situations in which their control was threatened was mediated by the salience of that lack of control. He suggested that, due to the importance to them of control, Type A individuals would tend to ignore threats to their control which were not particularly salient. Thus the moderate stress condition in the last experiment may have failed to make their lack of control salient to Type A subjects in the "no escape" pretreatment, therefore failing to produce learned helplessness effects in the test phase. In the high stress condition , however, Type A subjects were unable to ignore their previous inability to control the situation and tended to presume that control was still not possible in the test phase of the experiment.

This is an elegant explanation of the effects that were observed for Type A individuals, but does not really explain the reversal of these effects for Type B subjects. Glass carried out a series of 3 experiments designed to replicate and clarify the foregoing experiment. All of these studies involved the use of varying manipulations of pretreatment uncontrollability and differing levels of salience of these manipulations. Glass found general support for this previous study. The reversal of helplessness effects, however, found in the previous experiment for Type B subjects, were not replicated in these subsequent experiments.

Brunson and Matthews (1981) carried out a study to determine the effects that prolonged exposure to uncontrollability would have on the problem solving strategies employed by Type A and B individuals. Subjects were 45 male undergraduate university students who scored in the upper or lower thirds of a larger sample on the JAS (form T). Subjects attempted eight concept-formation problems while giving a verbal commentary on the strategies which they were using. For four of these problems subjects were led to believe that they were failing to solve the problem (uncontrollability condition). Half of the subjects received moderately evaluative feedback from the experimenter (moderate salience condition). The other half of the subjects were required to keep a record of correct and incorrect responses on the task (high salience condition).

Brunson and Matthews found that Type B subjects tended to employ effectual strategies across success and failure trials. Type A subjects however, tended to show a deterioration in the strategies which they employed across high salience failure trials. Thus Brunson and Matthews believe that prolonged salient failure may make Type A subjects adopt less effectual or non-effectual problem solving strategies. They believe that these data add further support to the notion that Type A individuals are more prone than their Type B counterparts to suffering helplessness after prolonged exposure to highly salient, uncontrollable situations. Another explanation of these data is possible, however, with reference to the hypothesis that Type A individuals are less able on cognitive tasks than Type B individuals (this hypothesis was discussed in the preceding two sections of this chapter). Type A subjects may have less faith in their processing capacities and problem solving strategies. Exposure to failure may have confirmed these doubts, inducing them to adopt a less representative and more rapid sampling of strategies and hypotheses. The Type B subjects may have more intrinsic faith in their own abilities (see Friedman et al, 1981) which would encourage them to continue with their more successfull strategies. Neither of the preceding explanations of

Brunson and Matthew's data offer direct support for the hypothesis that Type A individuals are prone to learned helplessness after prolonged, salient uncontrollability (Glass, 1977b).

Weidner (1980) carried out a learned helplessness study using 40 male university undergraduates as subjects. Subjects were classified as Type A or B by a median split on their JAS (form T) scores. In a standard type of helplessness inducing pretreatment phase, subjects attempted to solve four concept formation problems. Half of the subjects received reinforcement contingent on their performance, while the other half received non-contingent reinforcement. The salience of subject's failures was enhanced by the experimenter telling them "that's the wrong answer". All subjects were required to keep a record of their correct and incorrect answers. Before the next treatment phase of the experiment (subjects were led to believe their was another phase of the experiment) subjects were given the choice of either taking a drug which they believed would enhance their cognitive performance or one which would cause deteriorations in performance. Subjects also chose one of four dosage levels of the drug of their choice.

Weidner found that Type A subjects who were in the uncontrollable pretreatment were significantly more likely to engage in "self-handicapping" (by choosing to take high doses of the drug which they believed would adversely affect their performance), than the Type A subjects who had experienced pretreatment control and all of the Type B subjects. Weidner proposed that these Type A subjects engaged in self-handicapping in order to excuse what they saw as poor previous performance. These data, at best, offer only indirect support for the hypothesis by Glass (1977b).

A problem with the research reviewed so far has been the wide variety of outcome measures that have been employed. Many and various qualitative and quantitative cognitive performance measures, self-reported task strategies and choice of handicapping drug have all been used as indices of the efforts which subjects are applying or intending to apply to a variety of challenging tasks. Differing standards and instruments for subject selection are also problematic in attempting to interpret data from the preceding studies. Perhaps the greatest problem, however, has been the failure by researchers to attempt to equate levels of stress and strength of helplessness manipulations in their study with those employed in other, related investigations. With these methodological shortcomings, the preceding studies have managed to provide very little direct support for the hypothesis helplessness effects actually occurring amongst Type A subjects. A study which failed completely to support this hypothesis has also been reported.

Lovallo and Pishkin (1980) carried out an experiment designed to assess the effects of two levels of uncontrollability on Type A and Type B subjects. Eighty university students were paid to take part, with the 42 who could be clearly classified as either Type A or B by the structured interview, taking part in the actual experiment. Subjects experienced either success or failure during a patterned learning task and an anagram solution task in a pretreatment phase. They then attempted a concept formation task with half in a no noise condition and the other half of the subjects receiving a total of 2.5 minutes of loud noise in essentially random 15 second bursts.

Lovallo and Pishkin found no evidence of helplessness occurring in Type A subjects after prolonged exposure to salient uncontrollablity. They also found no evidence that Type A subjects initially respond to uncontrollability by exerting strong efforts towards coping. Lovallo and Pishkin criticised the methods of subject selection employed by Glass (1977b) by JAS and also the learned helplessness paradigm, which they believed to have been inadequately researched. This experiment constitutes a complete failure to replicate the previous research on Type A behaviour, control and helplessness. It appears to have been a well conceived and controlled study, however, which used a better selection procedure for subjects than most of the previous work.

Thus the second hypothesis by Glass (1977b), that prolonged, salient loss of control will lead Type A subjects to give up in their attempts to exert control, is not directly supported by the studies reviewed here. A number of studies, however, have employed a different approach to investigating these hypotheses. They have sought to determine whether differences between Type A and B individuals in their response to situations which challenge their control, will be manifested in changes in their physiological state. The basic premise of most of these studies has been that Type A subjects will respond to potentially uncontrollable situations with marked elevations in their level of physiological arousal. This arousal being caused by the "hyper-responsiveness" (eg. Glass, 1977b) which they manifest in response to their need to gain or maintain control.

3.5.3 Physiological responses to uncontrollabilty

Gastorf (1981) recorded the blood pressure of subjects while they attempted to solve 20 easy or 20 insoluble anagrams. 80 male and 80 female undergraduate university students were chosen as they had JAS (form T) scores 1-2 standard deviations extreme from the median of a group of 327. Crossed with the ease of task condition was a subjective challenge condition in which subjects were told that the task would be either easy or hard.

Gastorf found that Type B subjects only showed significant elevations in systolic blood pressure (SBP) when they attempted the hard task, having been told that it would be hard. Type A subjects however, showed significant elevations in SBP both when the task was hard and when they had been told that it would be hard (but it was not). Thus Type A subjects were found to respond to both an objective threat to their control (insoluble anagrams) and to a subjective threat (being told that the task would be hard) with physiological arousal. Gastorf also found that, whereas the self-reported arousal of Type B subjects tended to match their actual SBP data, Type A subjects only reported feeling more aroused in the objective challenge condition. Gastorf suggested from these data that Type A individuals may have difficulty in determining their own level of physiological arousal, a possibility which is discussed in the last section of this chapter.

This study by Gastorf supports the notion that Type A subjects do respond to uncontrollability with increases in their levels of physiological arousal. Gastorf only collected data on blood pressure however, which can not be taken as unequivocal proof of elevated level of arousal. Other studies have collected a more comprehensive range of physiological data. Glass, Krakoff, Contrada, Hilton, Kehoe, Mannucci, Collins, Snow and Elting (1980) carried out a second experiment to the one reported in the last section. Ten Type A and 10 Type B employed adult men were chosen as being Type A or B by use of the structured interview and were screened for health risk. These subjects were required to play eight trials of a video game (similar to "super pong") by themselves. Half of the subjects were given the added incentive of attempting to accumulate enough points to win a twenty-five dollar gift voucher. This game was also arranged so that subjects would find it extremely difficult and fail.

Glass _et al_ found that Type A subjects showed significantly greater elevations in SBP and diastolic blood (DBP) pressure during task performance. There were no significant interactions involving the incentive condition. Thus subjects were aroused by the challenging task. Glass _et al_ were only interested in showing that Type A subjects tended to manifest greater cardiovascular reactivity in response to a challenging task than Type B subjects. The nature of the task must also be seen as important here, however. The task required subjects to try to hit a ball through a very small opening (video simulated) which all subjects failed to accomplish reliably. This task may therefore be seen as a challenge to these subjects' sense of control which they failed to meet. Type A subjects were more aroused by this failure than Type B subjects, as would be expected if they possess a greater need to maintain control.

Pittner and Houston (1980) carried out an experiment to assess the physiological response of Type A and B subjects to threat to their self-esteem and to the physical threat of electric shock. Forty-two Type A and 42 Type B subjects were chosen as they had Vickers Type

A scale scores in the top or bottom quarters of a sample of 218 male undergraduate university students. This classification of subjects was corroborated using the JAS (form T). Subjects were required to complete a number memorizing task in one of three conditions (after pre-treatment). They were either told that they were doing well so far (low threat), or that they were slower than most other subjects (threat to self-esteem), or that they would be given painful electric shocks during the subsequent part of the experiment (physical threat). Finger pulse volume and rate, SBP and DBP were recorded through four periods of the task.

Type A subjects were found to manifest significantly higher pulse rate than Type B subjects throughout the task. Type A subjects also had significantly higher SBP and DBP than Type B subjects in the threat to self-esteem condition. Type A subjects were found to employ significantly more denial than Type B subjects and to report significantly less distress. Generally Pittner and Houston found that Type A subjects manifested greater physiological arousal during this challenging task but that they were particularly aroused in the condition which threatened their self-esteem. This condition threatened subjects' self-esteem by informing them that their previous performance had been poor. Therefore this condition can also be seen as constituting a threat to their sense of control and, as might be expected, it elicited increases in the arousal of Type A subjects.

Manuck and Garland (1979) carried out a study which attempted to assess the effect of task incentive on the level of physiological arousal of Type A and B subjects. Forty-four undergraduate male university students were selected as Type A or B by their scores on the JAS (form T) although Manuck and Garland do not provide details of selection criteria. Half of the subjects were given monetary incentives on a concept formation task, gaining 10-20 cents (on a sliding scale) for each correct response and losing 10 cents for each incorrect response. The remainder of the subject group received no incentives. There was no significant difference between the performance of Type A and B subjects in the incentive condition but in the no incentive condition Type A subjects solved significantly more items than Type B subjects.

Manuck and Garland also report that Type A subjects manifested significantly higher finger pulse pressure and SBP than Type B subjects during the task. Type A subjects were also significantly less willing than Type B subjects to state in attribution questionnaires that they could not have solved all of the items, if given sufficient time to do so. Manuck and Garland concluded from these data that Type A subjects respond to challenge in a more active and involved manner than Type B subjects and appear to resist helplessness effects better than Type B subjects. This study did not, however, employ a specific helplessness-inducing procedure so it is difficult to see how Manuck and Garland are able to conclude that Type A subjects resisted helplessness. The task appears to have been difficult enough to threaten the subject's sense of control but, once again, this study suffers from a failure to equate stress levels with those employed in previous studies.

Contrada, Glass, Krakoff, Krantz, Kehoe, Isecke, Collins and Elting (1982) carried out a study which subjected Type A and Type B individuals to prolonged stress and uncontrollability, while collecting a comprehensive range of data on physiological arousal and performance. Forty-seven Type A and 40 Type B subjects were selected by structured interview from a larger group of paid male volunteers employed by the New York City Police Department. Subjects were required to work on a choice reaction time task. All subjects received loud 3 second bursts of noise through headphones and electric shocks through electrodes attached to their calf muscle, during the task. Half of these subjects were led to believe that the noise was contingent upon their performance on the task which could be improved by learning the pattern underlying the task (there was actually no pattern). These subjects were also told that shocks would follow particularly slow responses. The other half of the subject group were told that both noise and shocks would be delivered at random. This contingency condition was crossed with a high or low frequency of aversive stimulation (noise and shocks) condition. Contrada _et al_ recorded SBP, DBP, and heart rate and collected blood samples at designated times during the experiment which were subsequently analysed for epinephrine and norepinephrine concentrations.

Type A subjects showed significantly greater elevations in SBP and heart rate than Type B subjects during the experiment. The effects for the epinephrine and norepinephrine levels were not clear however. Type A subjects in the contingency condition showed greater increments in levels of norepinephrine over trials of the task in comparison to Type A subjects in the non-contingency condition. The effect for Type B subjects was not clear, but did not parallel that found for the Type A subjects in the contingency condition. Type A subjects showed progressively shorter reaction time latencies over blocks of trials of the task in the contingency condition, whereas Type B subjects showed no change. Contrada et al admit that the results of this study are difficult to interpret but still manage to find some support for the proposal that Type A subjects make greater efforts to control the task than their Type B counterparts, when outcomes are contingent upon their performance. They also suggest that loud noise and shocks may not be appropriate stressors to induce arousal in Type A individuals, suggesting that threats of failure (see Pittner and Houston, 1980), may be more effective in producing cardiovascular responsiveness.

Thus, despite a relatively great volume of research on Type A behaviour, control and helplessness, there is really only clear support for the first of the two hypotheses formulated by Glass (1977b). Type A individuals appear to respond initially to a threat to their control (perceived or actual) with increased efforts to gain or maintain control. The second of these hypotheses, that prolonged exposure to salient, uncontrollable stress will lead to helplessness effects in Type A individuals, is not well supported by the studies reviewed. Although some support for this hypothesis has been reported, the variety of attempted helplessness manipulations and the variety of outcome measures that have been employed has prevented the emergence of a clear conclusion.

There is no real support for either hypothesis in the study by Contrada _et al_ (1982) and absolutely no support in the study by Lovallo and Pishkin (1980). Brunson and Matthews (1981) have criticised Lovallo and Pishkin, pointing out that their study was dissimilar to the series carried out by Glass and associates, in two very important ways. They suggest that Lovallo and Pishkin's subjects were never led to expect that they would be able to control the bursts of noise. They also suggest that as the feedback received by subjects in the pretreatment phase of Lovallo and Pishkin's experiment was contingent on their performance, this pretreatment phase did not constitute a true learned helplessness inducing manipulation. Obviously these factors may help to explain Lovallo and Pishkin's failure to replicate previous work; however they do not explain the the lack of replication in the study by Contrada _et al_.

3.5.4 Importance of methods of subject selection

The studies by Lovallo and Pishkin (1980) and by Contrada *et al* (1982) both employed the structured interview to assess Type A behaviour, whereas most of the studies which have lent support to the hypotheses in question (eg. Glass, 1977b) have employed the JAS. The other study reviewed in this section which employed the SI to select subjects was the second study by Glass *et al* (1980). This study only employed a challenging, uncontrollable game, however, with no helplessness-inducing pretreatment phase. It is possible that the control and helplessness effects found in the studies employing the JAS may have been artifacts of this method of subject selection. The SI has been found to be a much more accurate instrument for predicting Coronary Heart Disease than the JAS (evidence for this was reviewed in chapter 2.5). Thus, although Type A subjects selected by JAS may show a greater need to control their environment than Type B individuals selected in the same fashion, it is not possible (from the studies reviewed here) to relate this in any meaningful way to increased risk of CHD. It is possible that need to control is only associated with Type A behaviour as a function of style of reporting behaviour on a self-report inventory (the JAS) which does not hold when an interviewer makes a judgement about behaviour in an interview situation (the SI).

3.5.5 Problems with the interpretation of physiological data

The studies of physiological responses reviewed here also tend to provide some evidence that Type A subjects respond to threats to their control with increased efforts to maintain it. However, similar physiological effects reported in studies of competitiveness (reviewed in the preceding section of this chapter) were seen as reflecting the competitive nature of Type A individuals. Most of these physiological indices of arousal cannot be reliably attributed to subjects being stressed by a need for control or their own competitiveness. As suggested in the preceding section, perhaps Type A subjects find the intrusive nature of such studies more stressful than their more easy-going Type B conterparts. Data to support this notion have been reported from a study which actually found physiological arousal amongst Type A subjects who were prevented from working.

Frankenhaeuser, Lundberg and Forsman (1980) classified male university students as either Type A or B by their scores on a Swedish equivalent of the JAS (the authors fail to provide exacts detail of classification criteria but a split at the median is presumed to have been employed). Physiological parameters and self-reports of arousal were recorded while subjects performed mental arithmetic during noise distraction for one hour and while they relaxed (by listening to the radio and reading) for five hours. Type B subjects were found to show significantly elevated heart rate and elevations in adrenaline and cortisol excretion during work than at rest. Type A subjects only showed significantly higher heart rate while working. During inactivity Type A subjects secreted significantly more adrenaline and reported more distress than in the work condition or than Type B subjects in either the work or inactivity condition.

It is difficult to interpret the results of this study in the light of the previously reviewed studies, especially as the researchers fail to provide adequate details of Type A/B classification and on method and frequency of hormonal measurements. Nevertheless, the self-reports of distress when inactive, made by Type A subjects indicate that they find this inactivity upsetting and arousing. This result cannot really be explained in terms of their need to control. Type A subjects may just find a laboratory environment and their attachment to metering equipment threatening when forced to be inactive but during work they may be able to distract themselves from this threat. Thus doubts must be held about all studies in the last two sections which presented data on physiological arousal as indicating competitiveness or need for control in Type A subjects. It cannot be clearly determined that Type A subjects were not just responding to some generalized threat present in laboratory situations. It is distinctly possible that these subjects <u>may</u> become aroused by the perceived need to compete or control in such situations but this is not proven by the studies reviewed here.

3.5.6 Conclusions

In summary, there is some support in the studies reviewed here for the first hypothesis proposed by Glass (1977b) that Type A individuals tend to respond to threats to their control (perceived or actual) with increased efforts to maintain control. The second hypothesis, that prolonged, salient uncontrollability will induce learned helplessness effects in Type A individuals is less well supported. However, it is possible that the variety of experimental designs, subject selection criteria and outcome measures employed in these studies have prevented the emergence of clear support or disconfirmation of this hypothesis.

Data have been reported which indicate that this concern with control manifested by Type A individuals, increases their level of motivation and may have an effect on their level of arousal. Studies are reviewed in the following section which are concerned with Type A individuals responses to the presence of others. There is some indication that Type A individuals may prefer to work alone, especially in challenging situations. They also appear to be more motivated when working in the presence of others. This may be due to them perceiving other individuals as being essentially uncontrollable. Thus as they prefer to have control, Type A individuals may also prefer to work alone.

3.6 Effects of social setting on individuals possessing the CPBP

3.6.1 Affiliation preference

Studies reviewed to date have considered the behaviour of Type A and B individuals working and performing alone. The social setting and social relationships experienced by a person clearly have an influence upon behaviour. It might be expected that the Type A individual will show performance differences when interacting with people, especially in view of the known competitiveness and interpersonal hostility which has been observed amongst Type A individuals (eg. Van Egeren 1979a; 1979b).

Some evidence that Type A behaviour is associated with less affiliative behaviour has been reported from a questionnaire study. Suls, Becker and Mullen (1981) carried out a survey of 174 male university students. They found a low but significant correlation between JAS (form T) score and a preference for keeping problems to oneself ($r=0.25$, $p<0.01$). JAS score also correlated significantly with subjects' ratings of the truth of the statement:

"I have no one to talk to about my personal problems"

($r=0.25$, $p<0.001$). This study offers some indication that Type A individuals prefer to avoid affiliative behavior and perceive themselves as having little social support, but it must be stressed that these correlations are low and account for very little common variance.

A survey conducted by Matthews and Saal (1978) failed to find any evidence of a relationship between Type A behavior and affiliation motives. Ninety-four male university students took part in the structured interview and completed the JAS (form T) as measures of Type A behavior. Subjects also completed protocols for 4 Thematic Apperception Test (TAT) stimulus pictures (Murray, 1943) which were scored for affiliation motivation (Atkinson, 1958) by trained raters. Neither measure of Type A behavior was found to be related to affiliation motivation. The failure of this study to find any relationship between Type A behaviour and affiliative preference may be due to the fact that the relationship is too complicated to be elucidated by correlational and survey techniques. Atkinson (1982) has proposed from motivation theory that cross-situational responses to TAT items might be expected to yield low correlations. Thus it is possible that "static" elicitation of motives from TAT may not serve to elucidate relationships between the Type A pattern and affiliation motives due to the effects of a variety of motivational factors on TAT responses.

Dembroski and MacDougall (1978) carried out a series of three experimental studies aimed at determining differences between Type A and B individuals in affiliative preference by manipulating their social setting. In the first experiment subjects (50 male and female undergraduate university students) were given the choice of waiting to take part in a stressful procedure by themselves or in a group. Two stress levels were employed with subjects being told either that they would be receiving painful electric shocks (high threat) or subliminal stimulation (low threat). Type A and B subjects were classified by a median split of scores on the JAS (form T). Dembroski and MacDougall found that significantly more Type A subjects than Type B subjects wished to wait with others. Type A subjects showed a significant preference for working alone on the task in the high threat condition but this preference was not significant in the low threat condition.

In their second study Dembroski and Mac Dougall administered the JAS to 40 coronary patients and 40 matched controls. They found that the coronary patients had significantly higher JAS scores and were significantly less willing to work with others on a tough job, than the matched control subjects. In their third study Dembroski and MacDougall appended a question:

> "When you are under pressure to get a job done, do you prefer to work on the task alone or with the help of others?"

to the structured interview given to 66 male university students. They found that Type A subjects were significantly more likely than Type B subjects to prefer to work alone.

Thus Dembroski and MacDougall found that prior to a stressful task Type A subjects preferred to wait with others, whereas they prefer to work on challenging or stressful tasks alone. Given this situational mediation of the relationship between Type A behavior and affiliative preference, it is not surprising that straightforward dispositional measures fail to elucidate the area. Using dispositional measures of affiliation Suls, Becker and Mullen found only low correlations and Matthews and Saal found no evidence at all of a relationship between Type A behavior and affiliative motivation.

Dembroski and MacDougall believe that Type A individuals prefer to work alone as they value control in stressful situations (eg. Krantz, Glass and Snyder, 1974). Type A subjects have also been shown to respond to interruptions of their work on a stressful task with irritation and aggression (eg. Glass, 1977b). Obviously Type A subjects would have less control and more chance of being interrupted when working with others than when working alone. Dembroski and MacDougall suggest that Type A subjects prefer to wait for the stressful task in the company of other subjects, however, as they are more interested in social comparison information than their Type B counterparts. This interpretation seems rather speculative and is only indirectly supported by these data, yet this experiment has been quoted (eg. Matthews, 1982: Gastorf, Suls and Sanders, 1980) as providing direct evidence that Type A individuals are more interested than Type B individuals in social comparison information.

The preceding studies have concentrated on assessing the preferences of, and attitudes towards working with others held by Type A and B individuals. A study which sought to assess the actual effects of the presence of others on the performance of A and B Type subjects has also been reported.

3.6.2 Social Facilitation and the CPBP

Gastorf, Suls and Sanders (1980) carried out a study on social facilitation and the Type A behavior pattern. They administered the JAS (form T) to 120 male and 120 female undergraduate university students. Those who scored 1-2 standard deviations above the median were classed as Type A and those who scored 1-2 standard deviations below the median, as Type B. Gastorf et al found that the presence of a similar or superior coactor facilitated the performance of Type A subjects on a simple number copying task. The presence of a similar or superior coactor impaired the performance of Type A subjects on a complex version of the task, however. No significant effects were found for Type B subjects.

Gastorf et al interpret these results in terms of a presumed greater need of Type A subjects to engage in social comparison. They propose that this increased time spent by Type A subjects in comparing their performance with that of a coactor has produced attentional conflict in these Type A subjects. Thus Gastorf et al believe that the presence of a coactor distracted Type A individuals, creating increased drive levels which facilitated their performance on the simple task but impaired their performance when the task was more complex.

Gastorf et al base their interpretation, firstly on Dembroski and MacDougall's (1978) conclusion that Type A individuals are more interested in social comparison information than Type B individuals. This finding has already been questioned as speculative and not directly supported by the data reported by Dembroski and MacDougall. Some support for this argument is provided by Matthews (1982), however, who suggests that Type A individuals are interested in social comparison information as they possess only very vague standards for their performance. She believes that Type A subjects use social comparison information information in attempting to formulate standards which are appropriate to the situation in which they find themselves. Matthews offers no direct evidence for her hypothesis that Type A individuals possess only vague standards but proposes that this relates to the sense of time passing rapidly which Type A subjects have manifested experimentally (eg. Burnham, Pennebaker and Glass, 1975). She further proposes that the achievement striving characteristic of Type A individuals is also to be observed amongst those who find themselves with no clear standards available by which they can evaluate their abilities. Matthew's argument is interesting and plausible. This argument can only reasonabley be criticised with reference to the data which have been reported on the nature of standards held by Type A individuals; these data are discussed in the next section concerning the standards which Type A individuals hold for their own performance.

A second problem with the interpretation of their data by Gastorf et al is that they unquestioningly accept the argument by Sanders, Baron and Moore (1978) that social facilitation effects (which they presume are being produced in this coaction experiment) are mediated by distraction which produces increased drive. However, there are at least two other plausible explanations for the data reported by Gastorf et al.

The first alternative explanation concerns the well documented competitive nature of Type A individuals (already reviewed). Surely the coaction setting used in this experiment would elicit the full competitive drive of the Type A subjects, with concomitant increases in their drive levels. This procedure seems unlikely to produce distraction effects in Type A individuals as Matthews and Brunson (1979) found Type A individuals to concentrate on a stressful task to the exclusion of peripheral tasks and distractions (reviewed in the next section).

The second alternative explanation for these data involves another possible effect of the presence of a coactor on Type A subjects. Carver and Scheier (1981) have proposed that people become self-aware of learned standards which they hold for their behavior and performance when stimuli are present which focus their attention on themselves. Some stimuli, such as a mirror, may focus the individual's attention on private standards which they hold for themselves. The presence of others may, according to Carver and Scheier, make salient the publicly relevant standards which individuals hold. Thus the coaction setting employed by Gastorf et al may be making Type A and B subjects' public performance standards salient to them. There is a great deal of empirical evidence (reviewed in the next section) which indicates that Type A individuals hold higher performance standards than Type B individuals. The coaction setting may be making Type A subjects aware of their high standards. Attempts to achieve these standards may then increase their drive levels, creating the reported pattern of data (as would be predicted by a Hull-Spence drive-type account; eg. Zajonc, 1965).

These two alternative explanations may in fact be combined into a single explanation of the results of the social facilitation experiment carried out by Gastorf et al. As already suggested, the presence of a coactor may be making subjects aware of the public standards which they hold for their performance. The standards held by Type B subjects do not appear to be very high, so their drive level is not greatly affected by the presence of a coactor. Type A individuals on the other hand, tend to have extremely high standards for their own performance. It may be that Type A individuals, who have also been found to prefer to work alone, believe that they should compete in public situations. The competitiveness observed amongst Type A individuals may well be produced by their awareness of competitiveness as an appropriate public standard for behaviour.

There is more empirical support for this explanation of the Gastorf, Suls and Sander's data than there is for their own explanation. This is especially so given the lack of direct evidence that Type A individuals are interested in social comparison information and evidence (reviewed in the next section) that Type A individuals tend to set high standards for their own performance.

3.7 Standards for Performance

There is fairly comprehensive experimental and survey evidence that Type A individuals possess higher performance standards than Type B individuals. Matthews and Siegel (in press) classified 20 male and 20 female grade four school children as either Type A or Type B using the Matthews Youth Test for Health (Matthews and Angulo, 1980). They asked these children to think of a number of uses for five everyday objects (eg. a bar of soap). Half of the children were provided with an explicit performance standard that three uses per object was "pretty good", the other children were not given a performance standard. After completing the task all children were led to believe that they had got the sixth best score of 11 children who completed the task and were offered the chance to examine the score of one other child in the rank ordered list of 11. The rank that each child chose to inspect was taken as an indication of the standard for evaluation which they held for their own performance.

Matthews and Siegel found that Type A children chose the highest available score to inspect in both the explicit standard and no explicit standard conditions. Type B children only chose the highest score to inspect in the explicit standard condition. Matthews and Siegel propose that the children in this study tended to adopt high performance standards when situational requirements are vague. Their data also indicate that Type A children prefer to compare their performance with the highest available standard even when they know that they have performed quite adequately.

Type A university students have also been shown to adopt very high standards for their performance. Snow (1978) administered the JAS (form T) to a group of 53 male university students. Eighteen who scored in the top one third of the group were classed as Type A and the 15 in the bottom one third as Type B. These subjects were required to set goals for their performance on a task in which they had to connect consecutive numbers on a sheet of paper. Snow found that Type A subjects set higher goals for their performance than Type B subjects but that the difference was only significant for the first of the five trials. Type A subjects performed no better than Type B subjects on the task. Snow found that despite their repeated failure to achieve their goals, Type

A subjects continued to set excessively high goals for their performance. Thus these data support the notion that Type A individuals set high standards for themselves and also provide an indication that these standards are not set with reference to previous performance level. Snow's findings are supported by data from a similar study.

Grimm and Yarnold (1984) carried out a study of the expectations which a group of undergraduate university students held for their performance in mid-term and final examinations. From a group of 112 male and 85 female subjects who completed the JAS (form T), those with scores greater than one standard deviation above the mean were classed as Type A and those with scores more than 1.5 standard deviations below the mean as Type B. Grimm and Yarnold found that Type A subjects set significantly higher standards for their performance in both examinations than Type B subjects. They found no significant difference between the examination performance of Type A and B subjects. Grimm and Yarnold also found that, whereas Type B subjects set their standards with reference to their prior performance, Type A subjects did not. There is no evidence from this, or the previous study that Type A subjects possess vague standards for their performance. It is clear, however, that A Type subjects do not take their previous performance into account when setting standards for future performance.

Evidence for high performance standards of middle aged Type A individuals has also been reported. Mettlin (1976) carried out a survey of the attitudes towards work of 943 working men with an average age of 42 years (SD=10.4). He found a significant positive correlation between JAS score and expectation of rank that would be achieved before retirement (r=0.22). Mettlin also found a significant positive correlation between JAS score and subjects' perceptions about the level of their employer's expectation of them (r=0.21). Although these correlations are low, there appears to be a tendency for adult Type A individuals to set high standards for their own performance and to believe that others also set high standards for them.

Suls, Becker and Mullen (1981) in their study of 174 male university students, mentioned in the previous section, also report data that have some bearing on the relevance of standards for performance to Type A individuals. They report significant positive correlations between JAS (form T) score and subjects' ratings of the importance to them of feedback about (1) the best possible performance on the task at hand (r=0.40, p<0.001), (2) their own previous performance in previous attempts (r=0.36, p<0.001), and (3) the performance of peers (r=0.46, p<0.001). These data support both the notion that Type A individuals have high performance standards, and Dembroski and MacDougall's hypothesis that they are more interested in social comparison information than Type B subjects.

These data offer no support for Matthew's (1982) proposal that Type A individuals are more interested in social comparison than Type B individuals because their own performance standards are vague. This hypothesis does not seem consistent with data from the studies reviewed here, which make it obvious that Type A individuals have very high standards for their performance. These studies provide no data to enable a conclusion to be drawn about the relative clarity or vagueness of these high standards.

Evidence to suggest that Type A individuals may only be more likely to set high standards in response to challenge has been reported. Gotay (1981) carried out an experiment in which subjects expected to take part in a mixed-motive game (the nature of such games was outlined in section 3.4). Twenty-four females and 16 males who had the most extreme scores on the JAS (form T) of a group of 83 undergraduate university students took part in this experiment. Half of these subjects were led to believe that they should cooperate with their partner to maximise monetary payoff (in pennies) the other subjects were led to believe that they should compete to maximise the payoffs which they would receive. Subjects were then asked to estimate the level of payment which they expected to receive from the task. In all Type by condition combinations except for Type A subjects in the competition situations, subjects expressed the belief that their partner would get more money than they would. Type A subjects who expected to compete, however, indicated that they expected to receive a significantly higher payoff than their partner.

Thus it appears that Type A subjects do set high standards for their performance but that such standards may tend only to be elicited in competitive situations which invoke their Type A style of behaving. Gotay warns that self-presentational constraints may have influenced Type A subjects not to express an intention to compete, however, in the condition which encouraged them to co-operate. Therefore this experiment cannot be taken as proving that Type A individuals only set, or state that they have set, high standards in competitive situations. In the competition condition Type A subjects expressed an intention to win or to "beat" their partner to the experimenter. This then may be seen as a public commitment to the competitiveness which the situation is designed to invoke.

Perhaps the most conclusive finding from the studies reviewed here is that Type A subjects do not appear to be responsive to their previous performance level in setting standards for their future performance. There are two likely explanations for this effect. Firstly, it is possible that Type A individuals are so competitive and achievement oriented that they set high goals despite previous performance levels. A more likely explanation, however, is that they manage to ignore previous performance, especially if it has been poor. This hypothesis is in accord with the proposal by Glass (1977b) discussed earlier in section 3.5, that non-salient failures are ignored by Type A individuals. Type A subjects may choose to ignore previous performance which failed to reach their (high) standards and continue to set high standards. This hypothesis is also supported by a number of studies, reviewed in the following section, which indicate that Type A individuals tend to resist being self-aware in demanding situations.

3.8 Self-awareness and the CPBP

A number of studies of Type A behaviour and self-awareness have been reported. Questionnaire studies will be dealt with first in this review. Herman, Blumenthal, Black and Chesney (1981) carried out a study designed to assess the awareness which Type A individuals possessed of their own Type A pattern of behaviour. Twenty-four experts in the field of Type A behavioural research were asked to indicate those items on the Gough 300-adjective checklist (Gough and Heilbrun, 1975) which they thought were characteristic of Type A individuals and those which they thought were uncharacteristic of them. All of the adjectives checked by at least half of these experts were compiled to form an Adjective Check List Type A scale. Three hundred and seventy-eight (378) employed adult males (mean age=47.5 years) took part in the structured interview for Type A behavioural assessment and completed the Gough Adjective Checklist.

Herman *et al* found a significant linear relationship between subjects' interview (Type A) score and their endorsement of adjectives proposed as being characteristic of Type A individuals. From these data it appears that Type A individuals are aware of their Type A pattern of behaviour. Herman et al point out however that these individuals only tend to endorse socially acceptable adjectives, such as "aggressive", "assertive", "dominant", "outspoken" and "strong", and tend to avoid endorsement of less socially acceptable adjectives like "hostile", "irritable" and "bossy". Thus the self-awareness of Type A individuals appears to be limited to socially desirable aspects of themselves, or at least, it may only be these aspects which they are willing to report.

Thus Type A individuals might be seen as being self-aware of favourable characteristics of themselves. There is even evidence that they are more self-aware than their Type B counterparts. A study by Smith and Brehm (1981) reviewed at the beginning of this chapter produced a significant (although small) correlation between Type A behaviour and private self-consciousness for a female sample. This study indicates the possibility of some positive dispositional relationship between Type A behaviour and self-awareness.

Experimental evidence that Type A individuals are more self-involved than Type B individuals has also been reported. Scherwitz, Berton and Leventhal (1978) screened a group of 450 male undergraduate university students using the JAS (form T) and chose those who had scores greater than one standard deviation above (n=31

Type A subjects) or below (n=28 Type B subjects) the group mean to take part. Subjects were challenged by a battery of tasks including cold pressor, mental arithmetic and the generation and expression of emotions. Scherwitz et al assessed the number of self-references made by subjects during the structured interview and emotional expression exercise. They found that Type A subjects referred to themselves significantly more often than Type B subjects (about twice as often). From these data they concluded that Type A individuals were more self-involved than Type B individuals. It is not clear from this study, however, whether Type A subjects were actually more self-aware than Type B subjects or whether they were just more self-centred. Data from a number of other studies have indicated that Type A individuals are actually less self-aware than their Type B counterparts. These findings do tend to suggest that the data reported by Scherwitz et al are either anomalous or represent some self-centred aspect of the Type A pattern of behaviour.

Carver, Coleman and Glass (1976) ran a study to assess patterns fatigue reporting amongst Type A and B individuals subjected to a stressful, physical challenge. They did not originally interpret their data in terms of self-awareness but later experimental data supported such an interpretation. University undergraduate males were classed as Type A if they had a JAS (form T) score in the top 20% of a group of over 800 and as Type B if they had a score in the bottom 20% of this group. Subjects were excluded if their body weight was more than 20% over the average for their age and height and if they were members of any university athletic teams. The 10 Type A and 11 Type B subjects were required (individually) to walk on a motorized treadmill (at a speed of 90 metres/minute). The gradient of which was increased (from horizontal) by one percent every minute of the task. Subjects signalled a rating of their fatigue level to the experimenter every 2 minutes until signalling that they wanted to stop the exercise.

Type A subjects were found to utilize a significantly higher percentage of their aerobic capacity (91.4%) on the exercise than Type B individuals (82.8%). However Type A subjects reported significantly less fatigue during the task than Type B subjects. Even in their final fatigue rating during the task, Type A subjects reported significantly lower levels of fatigue than Type B subjects, despite being significantly closer to the limit of their physical endurance. Carver et al proposed from their data that the high achievement motivation of Type A subjects tended to make them suppress or deny fatigue during the exercise. Data from subsequent experiments, however, have tended to indicate the possibility that Type A subjects were merely less aware of their fatigue than their Type B counterparts.

Schlegal, Wellwood, Copps, Gruchow and Sharratt (1980) carried out a laboratory and field study of symptom reporting in a sample of 40 middle-aged men (mean age=48) who had suffered recent myocardial infarction. Twenty-seven subjects were classed as Type A and 13 as Type B by structured interview. In the laboratory task subjects were required to rate their level of fatigue at the end of a demanding session on a bicycle ergometer. No significant differences were found between Type A and B subjects in reported level of fatigue. This failure to replicate Carver et al may be due to sampling and procedural differences between the two studies, however, with the most plausible explanation being that the subjects had regular previous experience of the ergonometer exercise and therefore failed to see it as novel or challenging.

In their field study Schlegal et al had subjects maintain a symptom diary for two weeks. They found a moderate negative correlation ($r=-0.45$, $p<0.03$) between perceived challenge and daily number of symptoms reported by Type A subjects and a moderate positive correlation ($r=0.45$, $p<0.019$) between challenge and symptom reporting for Type B subjects. It appears from these data that Type A individuals who perceive themselves as being highly challenged may be less self-aware of physical symptoms than Type B subjects.

Weidner and Matthews (1978) carried out a study which assessed the effect of predictable and unpredictable noise on symptom reporting in a sample of 120 female undergraduate university students. Subjects who had JAS (form T) scores greater than the sample median were classed as Type A and those with scores less than the sample median as Type B. Subjects were required to solve arithmetic problems in either a predictable, unpredictable or ambient noise condition.

Subjects who received unpredictable noise reported significantly more physical symptoms than subjects in the other two conditions. Type A subjects reported less physical symptoms when they expected to continue working on the task than when informed that they had actually finished it. Type A subjects were also found to report significantly less physical symptoms than Type B subjects. Thus this experiment offers evidence that Type A subjects are less aware of or are less willing to report on their physical symptoms than Type B subjects. As with the previously reviewed study by Schlegal <u>et</u> <u>al</u> (1980), it also appears from this study that reduced symptom reporting amongst Type A individuals may be related to the situational challenge under which they perceive themselves to be operating. When Type A subjects believed that the challenging task was to continue they reported significantly fewer symptoms than when they believed that they had finished. This reduced rate of symptom reporting does not appear, however, from this and the next experiment under review, to be limited to situations where Type A individuals feel that they are under challenge.

Matthews and Carra (1982) studied the reporting of menstrual symptoms by Type A and B women. They had 29 female undergraduate university students complete the

JAS (form T), the Menstrual Distress Questionnaire (Moos, 1968) and the Self-consciousness Scale (Fenigstein, Scheier and Buss, 1975). Matthews and Carra found that the JAS correlated significantly with reported intensity of menstrual distress symptoms ($r=-0.37$, $n=25$, $p<0.03$). This correlation indicated that the more extreme Type A female subjects tended to report less menstrual distress. This study also supports the notion that Type A individuals tend to be less aware of, or less willing, to report their physical symptoms than Type B individuals. It is not possible to say from any of these studies however, whether Type A individuals are less self-aware than their Type B counterparts. It seems equally plausible to assume that Type A individuals are unwilling to report physical symptoms, perhaps considering that this would be a sign of weakness or lack of control. An hypothesis has been proposed by Matthews and Brunson (1979) to explain the effects reported in these experiments on symptom reporting.

Mathews and Brunson (1979) carried out a series of three experiments to investigate the way in which Type A and B individuals allocated their attention to primary and secondary tasks. In all of these experiments subjects were classed as Type A if they scored above the median of a large group of undergraduate university students who completed the JAS (form T) and as Type B if they scored below the median. In the first experiment, 10 Type A and 10 Type B subjects were required to work simultaneously on the Stroop Color Naming Task (Stroop, 1938) and on a simple intermittent reaction time task.

Matthews and Brunson found that Type A subjects had significantly slower reaction times than Type B individuals and responded to significantly fewer trials of the reaction time task than Type B individuals. Type A subjects correctly completed significantly more trials of the Stroop task than Type B subjects however. It appears from these data that Type A subjects tend to focus their attention on what they see as being central tasks to a greater extent, but pay less attention to peripheral events than Type B subjects. However, these data do not indicate whether this effect is due to dispositional differences between Type A and B individuals in direction of attentional focus, or whether it is produced by Type A subjects actively inhibiting their attention to peripheral events.

Matthews and Brunson carried out a second experiment to determine whether or not Type A subjects do actively inhibit their attention to peripheral tasks. Hartley and Adams (1974) found that subjects tended to perform better on the Stroop test during noise distraction. They reasoned that this was due to these subjects actively inhibiting their attention to the distractor and thereby also inhibiting the effects of the distraction built into the Stroop Test. Matthews and Brunson had 21 Type A and 21 Type B subjects complete the Stroop Test in either a distraction or no distraction condition. The distraction consisted of electronic music, sports commentaries, etc. presented to subjects via headphones.

In the no distraction condition there was no significant difference between the performance of Type A and B subjects on the Stroop Test. However Type A subjects performed significantly better than Type B subjects in the distraction condition, also performing better than Type A and B subjects in the no distraction condition. This effect was replicated in the third experiment. Matthews and Brunson see these data as supporting the notion that Type A subjects actively inhibit their attention to potential distractions from a central task. They further propose that Type A subjects actively inhibit their attention to anything which they see as having the potential to distract them from the central task, including peripheral tasks and self-awareness of their own physical state.

Matthews and Brunson see this hypothesis as serving to explain the evident lack of self-awareness which Type A individuals have of their own physical symptoms in challenging situations. They propose that Type A individuals tend to treat information about themselves as merely another potential distraction from the central task and therefore actively inhibit their self-awareness. This hypothesis also fits in with the proposal by Glass (1977b) that lack of control has to be made salient to Type A individuals before it can create increased motivation or helplessness effects. Glass believes that Type A subjects tend to ignore non-salient losses of control.

From the studies reviewed here it appears that Type A individuals only actively inhibit their attention to distractors in challenging situations where they must optimize their performance. The hypothesis by Matthews and Brunson (1979) that Type A individuals include information about themselves as a possible distraction is extremely plausible, especially in the light of the studies reviewed here, in which Type A individuals appear to suppress awareness of their physical symptoms. This hypothesis is also indirectly supported by findings from a recent study of category formation and Type A behaviour carried out by Humphries, Carver and Neuman (1983). From a sample of 160 university undergraduate students who completed the JAS (form T), those who scored in the top one third were classed as Type A (n=40) and those who scored in the bottom one third (n=40) were classed as Type B. Subjects completed a task which required them to recognize categories of letters under one, of four, levels of challenge.

Humphries et al found that Type A subjects were more likely to identify stimulus categories which occurred with great frequency and were less likely to identify low frequency attributes than Type B subjects (for levels of moderate and high challenge). In a subsequent recognition task Type A subjects were more certain (in terms of their confidence ratings) of recognizing high frequency attributes and more certain of failing to recognize low frequency attributes that Type B subjects (for levels of moderate and high challenge).

Humphries <u>et al</u> interpret these findings as supporting the Matthews and Brunson (1979) hypothesis that, under situational challenge, Type A individuals concentrate on central aspects of the task and actively inhibit awareness of peripheral aspects. There is still no direct evidence to the Matthews and Brunson proposal that Type A individuals actively inhibit self-awareness. In fact none of the reviewed studies actually shows that Type A individuals are less self-aware than their Type B counterparts. It is possible that Type A individuals are just as self-aware as Type B individuals but prefer, for some reason, not to report it. Perhaps they see self-reports of fatigue and physical symptoms as constituting some form of weakness. This notion would be supported by the suggestion that Type A individuals are less emotionally secure than Type B individuals (eg. Friedman, Thoresen and Gill, 1981). The data reported by Scherwitz, Berton and Leventhal (1978) indicating that Type A subjects were more self-involved than Type B subjects, suggest that Type A subjects are aware of themselves. They may just prefer to keep their feelings, especially of fatigue and physical problems, to themselves.

Thus, although the hypothesis proposed by Matthews and Brunson provides an extremely plausible explanation of the data reported in experiments on self-awareness and Type A behaviour, it remains unproven. It is not clear, from the experiments reviewed here, exactly what the nature of the relationship between Type A behaviour and self-awareness is. It is important, however, to elucidate this relationship for two reasons. Firstly, this relationship has direct bearing on the efficacy of self-report methods for Type A behavioural assessment. If Type A individuals resist being self-aware for some reason, this will affect the accuracy of their self-reports and lead to problems in developing self-report measures to the stage that they can be considered to be viable clinical tools.

Related to this question of the usefulness of self-report measures of Type A behaviour is the question of whether it is appropriate to use any self-report instruments with Type A individuals. If Type A individuals resist self-awareness as a matter of course, any self-reported information which they provide may be inaccurate. If such a relationship cannot be proven to exist at all, or if it is only manifested under extreme challenge, however, self-report information from Type A individuals may be as reliable as that provided by their Type B counterparts.

Secondly, self-awareness is obviously closely involved in any attempt to change maladaptive behaviours (see Thoresen and Mahoney, 1974, p. 40). An inability or unwillingness to be aware of their pattern of behaviour may render the process of behaviour change extremely difficult for Type A individuals. Processes for modifying Type A behaviour are starting to receive attention from researchers (eg. Friedman, et al, 1982). Obviously information about possible limitations on the levels of self-awareness which Type A individuals are capable of, is very relevant to such attempts.

The research reported in this thesis was designed to investigate and elucidate the nature of the hypothesized relationship between the Type A behaviour pattern and self-awareness in a systematic and comprehensive fashion. Two basic approaches were used. Firstly, two studies which used dispositional measures of Type A behaviour and self-awareness are reported here. Secondly, three experiments which sought to enhance the self-awareness of Type A and B subjects are reported. To the author's knowledge, such a comprehensive approach to elucidating the relationship between Type A behaviour and self-awareness had not been attempted previously.

CHAPTER FOUR

4.1 Introduction

From the studies concerning Type A behaviour and self-awareness reviewed at the end of the last chapter (section 3.8), it appears that Type A individuals may tend to be less willing to be self-aware than their Type B counterparts. The first approach to investigating this relationship to be reported in this thesis involved the study of dispositional self-awareness. If reliable differences between Type A and B individuals in their preparedness to be self-aware could be identified in the experiments already reviewed, it seemed likely that a relationship between dispositional measures of Type A behaviour and self-awareness might also be found. At the time when this survey was carried out, no previous studies that had used psychometric techniques to investigate this, or similar, hypotheses could be found in an exhaustive search of the literature.

This pilot study was undertaken to test the hypothesis that some relationship does exist between the dimension of Type A coronary-prone behaviour and the individual's predisposition to be self-aware. This study employed two commonly-used self-report measures of Type A behaviour, the Jenkins Activity Survey for Health Prediction (Jenkins, 1979) and the short form of the Bortner Type A scale (Bortner, 1969). Both of these measures have previously been described, and their reliability and validity discussed (in chapter 2.5).

Two self-report measures of dispositional self-awareness were employed. Dispositional self-awareness has been described by Fenigstein, Scheier and Buss (1975) as a general predisposition to be aware of the self. This does not necessarily connote a disposition towards nervousnes or embarrassment according to Fenigstein _et al_ who have, however, identified a dimension of _social anxiety_ which is related to dispositional self-awareness. Social anxiety is seen by Fenigstein _et al_ as a predisposition to be apprehensive at the prospect of being evaluated in social situations (further detail is provided below).

The Self-consciousness scale (Fenigstein, Scheier and Buss, 1975) was developed from a set of (n=38) items compiled to assess an individual's level of concern in seven different areas which the authors believed were representative of self-consciousness. Fenigstein _et al_ believed that:

> "(a) preoccupation with past, present, and future behavior; (b) sensivity to inner feelings; (c) recognition of one's positive and negative attributes; (d) introspective behavior; (e) a tendency to picture or imagine oneself; (f) awareness of one's physical appearance and presentation; and (g) concern over the appraisal of others." (Fenigstein _et al_, 1975, p. 523),

represented the general dimension of self-consciousness. Factor analysis yielded 3 interpretable factors which accounted for 43% of the variance. The "private" self-consciousness factor mainly reflected the individual's disposition to attend to inner thoughts and feelings. The "public" self-consciousness factor reflected a disposition to perceive oneself as a social object. The third factor was named "social anxiety" by Fenigstein _et al_ as it reflected "discomfort in the presence of others".

The Self-consciousness scale was revised to a final version containing 23 items to be rated on a 5-point scale of 1 (extremely uncharacteristic) to 5 (extremely characteristic) of the respondent. Fenigstein _et al_ report from a 2 week test-retest reliability check on a sample of 84 undergraduate university students, correlations of $r=0.84$ for public self-consciousness, $r=0.79$ for private self-consciousness and $r=0.73$ for social anxiety.

Fenigstein _et al_ report no data concerning the validity of their scale but Turner, Scheier, Carver and Ickes (1978) found that public self-consciousness correlated significantly with the Snyder's "Self-monitoring of Expressive Behavior" scale in a number of their studies. The best of these correlations was $r=0.30$ ($n=185$, $p<0.01$) and the worst was $r=0.19$ ($n=258$,

$p<0.01$). Private self-consciousness also correlated with Self-monitoring in one study ($r=0.27$, $n=146$, $p<0.01$) as did social anxiety ($r=-0.37$, $n=146$, $p<0.01$). These researchers also found that private self-consciousness was significantly correlated with the Guilford-Zimmerman Thoughtfulness Scale (Guilford and Zimmerman, 1949). Carver and Glass (1976) found that public self-consciousness was significantly related to a measure of sociability (Buss and Plomin, 1975).

The Self-consciousness scale also appears not to assess dimensions which should theoretically, be independent the dimension of self-consciousness. Carver and Glass (1976) found that private and public self-consciousness were not significantly correlated with a measure of intelligence (Otis, 1954), need for achievement (Edwards, 1957), test anxiety (Mandler and Sarason, 1952), activity level or impulsivity (Buss and Plomin, 1975). Turner et al (1978) found that these subscales were not related to social desirability (Crowne and Marlowe, 1964).

As it has been found to correlate significantly with the 3 sub-scales of the Self-consciousness scale, the Self-monitoring of Expressive Behaviour scale (SM) developed by Snyder (1974) was also employed in this study. Snyder developed this scale to assess the dispositional sensitivity of individuals to the contingencies associated with their behaviour in social situations (eg. Snyder, 1979). Snyder (1974; 1979) traces the development of this approach to the early literature concerning the situational specificity of self-presentation which started with the work of William James in 1890 (see Gordon and Gergen, 1968 for a review of this literature). Snyder (1979) describes the prototypic high self-monitoring individual as:

> "one who, out of a concern for the situational and interpersonal appropriateness of his or her social behaviour, is particularly sensitive to the expression and self-presentation of relevant others in social situations and uses these cues as guidelines for monitoring (that is regulating and controlling) his or her own verbal and non-verbal self-presentation." (p. 89).

Snyder describes the self-presentation of low self-monitoring individuals on the other hand as:

> "controlled from within by their affective states and attitudes (they express it as they feel it) rather than molded and tailored to fit the situation." (p.89).

Thus Snyder (1974) designed the SM scale to assess the disposition of individuals to monitor their own expressive behaviour. In developing this scale he compiled 41 true-false self-descriptive items. These items were composed so as to assess:

> "(a) concern with the social appropriateness of one's self-presentation; (b) attention to social comparison information as cues to appropriate self-expression; (c) the ability to control and modify one's self-presentation and expressive behavior; (d) the use of this ability in particular situations; and (e) the extent to which the respondent's expressive behavior and self-presentation is cross-situationally consistent or variable." (Snyder, 1974, p.529).

From the original 41 items, the 25 which were found to maximize the internal consistency of the scale, were included in the final measure. Snyder carried out various studies to validate this scale. He found that a sample of (n=24) actors scored significantly higher than undergraduate students who scored significantly higher than a sample of hospitalized psychiatric patients. As actors are trained to monitor their own expressive behaviour and psychiatric patients are generally found to be poor at this type of self-monitoring, Snyder interpreted these results as providing evidence of the validity of this scale. Snyder also carried out a peer rating study in a sample of students who were living together (n=16). He found that high scorers on the SM scale were significantly more likely to be rated by their peers as monitorers of their own behaviour than low scorers on the SM scale.

Research data which indicate that high scorers on the SM scale are much better able, than low scorers, to communicate a wide variety of emotions have been reported (Snyder, 1974). High SM scorers have also been found to be more accomplished at deceiving others in face-to-face interviews, than low scorers (Krauss, Geller and Olson, 1976). Evidence that high SM scorers remember more about those with whom they interact than low SM scorers, has also been reported (Berscheid et al, 1976). In response to these, and other data, Snyder (1979) claims that the SM scale is a valid method of assessment of individual differences in the predisposition of individuals to monitor their own expressive behaviour. Snyder reported no reliability data for this scale, however, and experimental evidence (reported after this experiment had been carried out) which indicates that the SM scale is not unidimensional is discussed in chapter 5.

Turner et al (1978) found significant correlations between a self-esteem scale (Morse and Gergen, 1970) and the private ($r=-0.26$, $n=505$, $p<0.01$), the public ($r=-0.26$, $n=505$, $p<0.01$) and the social anxiety ($r=-0.35$, $n=505$, $p<0.01$) sub-scales of the self-consciousness scale. For this reason a brief Self-esteem scale developed by Cutick (1962) was also included in this study. This particular scale was chosen due to its brevity (8 items) as there was no strong conceptual basis for its inclusion, and as subjects were already being asked to complete quite a large package of questionnaire scales in this study.

The Cutick Self-esteem scale requires respondents to indicate as a percentage, their level of confidence in a variety of specific situations. This format seemed to be likely to show up differences between Type A and B subjects, given the interest which Type A individuals have in gaining and maintaining control of their environments (reviewed in Chapter 3.5). Reliability and validity estimates for this scale are not available.

4.2 Method

4.2.1 Questionnaire Scales

Scores were computed for the Type A, Speed and Impatience (SI), and Hard-driving and Aggressive (HDA) sub-scales of the Jenkins Activity Survey for Health Prediction (JAS) using the weighted scoring system (Jenkins, 1979). The Job Involvement subscale of the JAS was not computed as most of the subjects in this study had only ever been full-time students. Although designed for use by employed adult subjects the JAS seemed to be appropriate for use with a student sample (a copy of the instruction page of this scale is included in appendix A.2). Printed at the top of the first page of the JAS were instructions to the effect that although the questionnaire was designed for middle age subjects, students should attempt to answer all questions, treating their previous studying as their work experience in order to answer questions about work (see appendix A.2). Subjects also completed the short form of the Bortner (1969) rating scale for assessment of the CPBP. This scale contains the 7 items, out of the original 14, which were found to discriminate best between Type A and B subjects (a copy of this scale is included in appendix A.3).

Scores on the Private Self-consciousness, Public Self-consciousness and Social Anxiety subscales of the Self-consciousness Scale (Fenigstein, Scheier and Buss, 1975; a copy of this scale is included in appendix A.4) were computed for each subject. Subjects also completed the Snyder Self-monitoring (of Expressive Behaviour) Scale (Snyder, 1974; a copy of this scale is included in appendix A.5) and a self-esteem scale (Cutick, 1962; a copy of this scale is included in appendix A.6).

4.2.2 Subjects and Procedure

Two hundred and thirty-three undergraduate psychology students completed the JAS in large group testing sessions as part of a course requirement. One hundred of these students who had JAS Type A scale scores of one half of one standard deviation or more (50 high scorers and 50 low scorers), extreme from the group mean, completed the other questionnaire scales individually before taking part in an experiment. These subjects were approached to take part by telephone. Fifty subjects, chosen at random from the original group who completed the JAS, were also approached through the University's internal mail service. Thirty-one of these subjects returned scoreable protocols of the questionnaire scales.

4.3 Results

The normative data for both the surveyed population and the selected sample, for all measures of Type A behaviour are presented in Table One. As subjects in the selected sample were selected by their JAS Type A scale score, it is of interest to note that the population and sample means and standard deviations for this measure are very similar. The fact that the standard deviation for the selected sample is slightly greater (69.7) than the one for the population (64.1) is to be expected, as 100 of these subjects were selected for their scores (one half of a standard deviation, or more, removed from the population mean) on the JAS Type A scale.

Table 1: Normative data for all Type A measures

	Population (N=233)		Selected Sample (n=131)	
	Mean	SD	Mean	SD
JAS Sub-scales:				
Type A Scale	217.7	64.1	215.3	69.7
Speed & Impatience	171.0	60.6	171.8	65.2
Hard-driving, Aggressive	106.0	25.3	106.3	24.4
Bortner Type A			25.4	3.6
Age	20.6	6.8	20.7	6.6

A matrix of correlation coefficients was computed for all measures employed in this study (presented in table 2). Separate analyses were carried out for male and female subjects but in no case was a correlation coefficient significant for one sex and not the other. There were also no significant differences between the

Table 2: Matrix of correlations between scales

Scales	2	3	4	5	6	7	Snyder SM	Self-esteem
JAS Scales:								
1. A	63+	.55+	.33+	.07	.01	-.195*	.18*	.16*
2. SI		.17*	.34+	.15*	.14	.01	.195*	-.07
3. HDA			.25*	.23*	.14	-.16*	.14	.27+
4. Bortner				.04	.11	.02	.19*	.05
Self-Consciousness Subscales:								
5. Private					.38+	.20*	.12	.01
6. Public						.34+	.23*	-.12
7. Social Anxiety								-.47+

Note: All correlation coefficients (Pearson product-moment) are presented for n=131 subjects (excepting the intercorrelations between the JAS scales for which N=233).

*p<.05 +p<.001

sexes on any measure. Very little support was found in the matrix of correlations (see table 2) for the hypothesis of a relationship between Type A behaviour and dispositional measures of self-awareness. The JAS Type A scale failed to correlate significantly with private or public self-consciousness but did show a low correlation with the Social Anxiety subscale of the Self-consciousness scale (r=0.195). The Type A scale of the JAS also correlated significantly with the Snyder Self-monitoring scale (r=0.18) and with the Self-esteem scale (r=0.16) but once again these correlations are low.

The Bortner Type A scale did not correlate well with the JAS Type A scale (r=0.33), considering the fact that it is designed to assess the same pattern of behaviour. As might be expected, there was a moderate negative correlation between the Social Anxiety subscale of the Self-consciousness scale and the Self-esteem scale r=-0.47).

All questionnaire scales were factor analysed using a principle components analysis with varimax rotation (Statistical Package for the Social Sciences-SPSS-Nie *et al*, 1970). The data from the 133 subjects who completed all scales fulfilled the requirements for the application of this procedure. Scattergrams plotted for all correlations (but requiring too much space to be included in this thesis) indicated no relationships to be curvilinear (Child, 1976 maintains that factor analyses should not be carried out on such data). Despite the fact that a majority of the subjects were extreme scorers on the JAS Type A scale, the Type A data were not found to be excessively bi-modal. Neither were the data from any scale excessively skewed or truncated (the factor analysis procedure should not be applied to excessively skewed, multi-modal or truncated distributions according to Child, 1976). The factor loadings for the four factors with eigenvalues greater than one (this is the most commonly employed criterion for determining number of factors to be considered, it is known as Kaiser' criterion, see Child, 1976) are presented in table 3. Only factor loadings greater than 0.3 are presented in table 3 as this is considered to be quite a rigorous criterion, appropriate to sample sizes between 50 and 300 (see Child, 1976)

Factor one appears to represent the Type A behavioural dimension, with all sub-scales of the JAS, and the Bortner scale loading on it. The failure of any of the Self-consciousness scale sub-scales or the Snyder Self-monitoring scale to load on this factor, offers further disconfirmation of the hypothesis. Factor two may be seen as representing a dimension of self-esteem as the Self-esteem scale and the Social Anxiety subscale of the Self-consciousness scale both load on it (in opposite directions).

Table 3: Factor analysis of questionnaire scales

Factors	1	2	3	4
Eigenvalues	2.445	1.830	1.263	1.044
Proportion of Common Variance	24.5%	18.3%	12.6%	10.4%
JAS Scales:				
Type A	.865	-	-	.311
SI	.769	-	-	-
HDA	.359	-	-	.664
Bortner	.420	-	-	-
Self-Consciousness Subscales:				
Private	-	-	.448	-
Public	-	-	.745	-
Social Anxiety	-	-.847	-	-
Snyder Self-Monitoring	-	-	.341	-
Self-esteem	-	.576	-	-

Note: Varimax rotation with Kaiser normalization (SPSS). This table presents all factors with eigenvalues greater than 1 and all factor loadings greater than 0.3.

Private and public self-consciousness and self-monitoring all load on factor three. This factor may be seen as representing a dimension of self-awareness. Factor four seems to represent the hard-driving and aggressive component of Type A behaviour, with this sub-scale and the Type A sub-scale of the JAS loading on it. Curiously the Bortner scale does not load on this factor as it might be expected to do.

4.4 Discussion

There is very little support in the data from this study for the hypothesized relationship between the dimensions of Type A behaviour and dispositional self-awareness. None of the three sub-scales of the Self-consciousness scale correlated significantly with the JAS or Bortner measures of Type A behaviour. No such relationships were found in the separate analyses which were carried out on data from male and female subjects. Thus this study fails to replicate the low but significant correlation between Type A behaviour (measured by JAS) and private self-consciousness ($r=0.23$) reported by Smith and Brehm (1981) for a sample of university undergraduate female subjects.

The JAS Type A and SI subscales, and the Bortner Type A scale all correlated significantly with the Snyder Self-monitoring scale (SM). These correlations were all low, however, accounting for less than 4% common variance in each case. Thus such correlations are extremely difficult to interpret. It would appear that

Type A individuals may be slightly more likely than their Type B counterparts to monitor their own expressive behaviour. These effects are rendered even more difficult to interpret however, in the light of data reported by Briggs, Cheek and Buss (1980) from a re-analysis of the Self-monitoring scale.

Briggs et al factor analysed a version of the SM scale which had respondents rate themselves on a five-point scale for each item in place of the original true-false format. They found that the SM scale yielded 3 replicable factors which they named "acting", "extraversion" and "other directedness". Briggs et al criticise the SM scale, proposing that the construct of self-monitoring of expressive behaviour is not adequately assessed by this scale. They point out that none of the 3 factors yielded by their analyses appear to relate to this construct.

In the present study the original true-false format was employed, rendering rescoring of the component factors of the SM scale impossible. Thus it is not possible to say what the low correlations between the total SM scale scores and the Type A measures mean. Type A behaviour and extraversion have shown to be related (eg. Chesney et al, 1981), thus the possibility exists that the correlations found in this study may have been due to the extraversion factor in the SM scale being related to Type A behaviour. Therefore, these correlations between the SM scale and measures of Type A behaviour can not be interpreted as supporting the hypothesized relationship between Type A behaviour and self-awareness.

Type A behaviour does not appear to be meaningfully related to self-esteem in this study as the Self-esteem scale only shows a low correlation with the JAS Type A measure. The HDA scale of the JAS does appear however, to be related to self-esteem. Those who are high in hard-driving, aggressiveness appear to also have higher self-esteem. These two findings are consistent with the low negative correlations between the Type A and HDA sub-scales of the JAS and the social anxiety scale of the Self-consciousness scale.

As might be expected from other research findings, there is a moderate negative correlation between self-esteem and social anxiety. Buss (1980) found a significant correlation between his measures of audience anxiety and self-esteem (r=-0.34). He proposed that audience anxiety is a type of social anxiety (he also suggested that social anxiety is manifested in shame, shyness and embarrassment; see Buss, 1980, p.210-213). Nichols (1974) listed low self-esteem as a frequently occurring characteristic in a group of psychiatric patients who were suffering severe social anxiety.

The general pattern of the correlation coefficients (reported in Table 2) indicates, with the necessary exception of those which involve the self-monitoring scale, that there is some consistency amongst these measures. From this matrix of correlations it appears that the scales are assessing the constructs which they purport to assess. From the factor analysis loadings, however, it is quite clear that there exist separate factors; representing Type A behaviour (factor 1), social anxiety/self-esteem (factor 2), self-consciousness (factor 3) and a hard-driving, aggressiveness/Type A behaviour factor (factor 4). Thus it is apparent from this factor analysis (Table 3), that there is no relationship between the dimensions of self-awareness and Type A behaviour as assessed in this study.

It seems necessary, in the light of the failure of this study to elucidate any relationship between Type A behaviour and self-awareness, to question seriously the validity of the measures employed. The validity of the Self-monitoring scale has already been determined to be unsatisfactory (eg. Briggs et al, 1980) and the correlations between it and the Type A measures cannot necessarily be considered to indicate any support for the hypothesis. The possibility of these correlations being an artifact of an underlying dimension of extraversion within the SM scale has already been considered. The validity of the Self-consciousness scale must also be questioned, although it has been widely employed and is generally accepted as being a useful measure (see Carver and Scheier, 1981). The fact that the private self-consciousness sub-scale of this instrument has been found elsewhere to correlate with a JAS measure of Type A behaviour for females (e.g. Smith and Brehm, 1981) indicates that it may be useful in elucidating the hypothesized relationship between these two dimensions but fails to explain why no such result was found in the present study.

The measures of Type A behaviour employed in this study must also be questioned. As previously discussed (in Chapter 2.5) the JAS does tend to misclassify a high proportion of respondents in comparison with the structured interview (evidence that the SI is the best available method for Type A behavioural assessment was reviewed in chapter 2.5). The JAS was the best measure available to the author at the time this study was carried out, however. The JAS has been widely employed by those who do not have access to the use of the interview and reasonable levels of reliability have been reported for it. It has generally come to be seen as the next best method to the structured interview for assessment of Type A behaviour (eg. Jenkins, 1978). The Bortner scale has not been as widely used, however, (see chapter 2) and the level of correlation between it and the JAS Type A scale was extremely disappointing, given that these two measures purport to assess the same behavioural dimension. The use of self-report instruments in the assessment of Type A behaviour, with particular reference to abbreviated measures such as the Bortner scale is discussed at some length in the next chapter.

Other problems may exist in attempting to use self-report measures to investigate the possibility of a systematic relationship between Type A behaviour and self-awareness. It is likely that Type A individuals do not respond well to questionnaire procedures. Friedman, Thoresen and Gill (1981) have proposed that Type A individuals tend to see questionnaires as trivial and a waste of time and do not tend to pay very close attention to the answers which they give (this possibility was discussed in chapter 2.5). If this is the case, the Type A subjects who took part in this study may not have been greatly motivated to take care in answering questions about their general mode of self-awareness. Thus, the hypothesis of a relationship between Type A behaviour and self-awareness might not be expected to be supported, much less elucidated by this study.

A further problem with the present study might be that the suspected relationship between Type A behaviour and self-awareness may, at least in part, be situationally determined. The Self-consciousness scale was developed to assess trait or predispositional aspects of the individual's tendency to be self-aware. Given the shortcomings in this study that have already been discussed, there is no evidence to support the hypothesis of a relationship between a person's typology (on the A/B dimension) and their predisposition to be self-aware.

Most of the experimental data on which this hypothesis was based, however, came from brief, stressful tasks. For example Carver, Coleman and Glass (1976) employed a physically stressful treadmill exercise.

Weidner and Matthews (1978) subjected subjects to a demanding cognitive task, rendered even more stressful by uncontrollable bursts of loud noise. Matthews and Brunson (1979) have proposed that Type A subjects actively inhibit their attention to potential distractions, including self-awareness, when they are involved in a demanding task. If Matthews and Brunson are correct, it may be that differences between Type A and B subjects in their propensity to be self-aware may only emerge in such stressful and demanding situations.

In the light of this study and its likely shortcomings, another study of dispositional self-awareness and Type A behaviour was carried out. The study reported in the next chapter (chapter 5) sought to use better measures of Type A behaviour and to attempt to get information about their patterns of self-awareness from subjects in a more demanding and stressful situation.

CHAPTER FIVE

5.1 Introduction

The possibility that Type A individuals only tend to inhibit self-awareness in demanding situations was entertained as a likely reason for the failure of the last study (reported in chapter 4) to provide support for the hypothesis of a relationship between Type A behaviour and self-awareness. It was also considered possible that the use of the Jenkins Activity Survey, which has been found to misclassify up to one third of respondents in comparison to the structured interview (eg. Jenkins, 1978), may have contributed to this failure to find support for the hypothesis. The study reported in this chapter was designed to overcome these problems and, hopefully, to support both the hypothesis of a relationship between Type A behaviour and self-awareness and to elucidate the nature of this relationship.

Self-report measures of Type A behaviour have been criticised for their low correlations with the structured interview (eg. Jenkins, 1978; Chesney et al, 1981). Friedman, Thoresen and Gill (1981) believe that Type A subjects do not respond well to self-report procedures, failing to take them seriously. This may help to explain both these low correlations between self-report and structured interview measures of Type A behaviour which have been reported in the literature and also the lack of support for the hypothesis of a relationship between self-report measures of Type A behaviour and of self-awareness in the last study.

This second study of dispositional self-awareness and the Type A/B behavioural dimension was designed around the use of the videotaped structured interview (VSI; see Friedman _et al_, 1981 for a description). The VSI is believed to be superior to self-report measures of Type A behaviour as it challenges subjects (eg. Innes, 1981), engages and holds their attention (which self-report measures are believed to be unable to do according to Friedman _et al_, 1981) and allows subjects less opportunity to dissemble (eg. Jenkins, 1978). The advantages of the VSI over the other methods of Type A behavioural assessment were discussed in some detail in chapter 2 (section 2.5). Questions about self-awareness were included near the end of the VSI procedure in an attempt to take advantage of the challenging situation which it engenders. Thus it was hoped that Type A and B subjects would be attentive and responsive to these questions. The interview self-awareness questions were composed so as to be relevant to the preceding interview, and to assess aspects of self-awareness which seemed intuitively to be relevant to the A/B behavioural dimension.

The following questions were appended to the interview. These questions were composed with the help of a number of individuals who had had considerably more experience in the use of the interview than the author. Dr. Carl E. Thoresen and Jean R. Eagleston of the School of Education at Stanford University, and Nancy Fleichmann of the Harold Brunn Institute (San Francisco) provided ideas about areas in which the dimensions of Type A behaviour and self-awareness might be related. Jean Eagleston helped with the actual composition of the questions that were employed.

The last question of the version of the structured interview used by Dr. Meyer Friedman (see Friedman et al, 1981) in the Recurrent Coronary Prevention Project (see Friedman et al, 1982) is:

> "All of us have insecurities, what are your insecurities about?".

In order to follow on from this question, the first self-awareness question appended was:

> "Are you often aware of these insecurities?".

This question was designed to try to get an idea of subjects' preparedness to be aware of potentially uncomfortable personal factors. It was hoped that this would, in a simplified fashion be a private self-awareness question (perhaps correlating with that factor of the Self-consciousness scale). The second self-awareness question sought to determine whether subjects were aware of inhibiting their self-awareness as Matthews and Brunson (1979) suggest might be the case for Type A individuals. The second question was:

> "Do you try to avoid being aware of your insecurities?".

The third self-awareness question was asked in order to concentrate on the possibility of situational effects operating on the patterns of self-awareness of Type A and B individuals. Having already been asked about awareness of personal insecurities, subjects were asked about their self-awareness in work-oriented, and hopefully, more demanding situations. The third question was:

> "Do you like to keep a close check on your work (or studies)?".

Following up this question was a related question which, once again attempted to assess whether or not subjects were aware of any situational constraints on their patterns of self-awareness. The fourth question was:

> "Can you check on your work while you are working or do you have to stop and think about it?".

The next question focussed on the possible situational aspect of self-awareness again but this time the question enquired about self-awareness in social situations. It was hoped that this question would relate to the public self-consciousness factor of the Self-consciousness scale. The fifth self-awareness question was:

> "Do you like to keep a close check on your behaviour in social situations?"

In an attempt to get an idea of each subject's ability or lack of ability to be self-aware while in a demanding situation the last question was:

> "Have you been wondering what this interview is about?".

These self-awareness questions were presented in the same style as the interview, with subjects being given no idea that they were not a normal part of that procedure.

Despite the poor correlation of the Bortner Type A scale with the JAS in the first study, it was included in this study along with another short rating scale of Type A behaviour developed by Vickers (1973). These scales were included due to their attractiveness as instruments which might allow relatively inexpensive (in terms of time and money) screening of large subject samples. Although very little information about the reliability and validity of such scales is available (both scales are reviewed in chapter 2.5), their ease of application greatly enhances their potential value. The object of including them in this study was to assess the extent to which they correlated with the structured interview. It was for this reason, and to make this study a partial replication of the first questionnaire study, that the JAS was also included here.

Naturally the Self-consciousness scale was included in this study as it appears to be the best available instrument for assessing dispositional self-awareness.

Snyder's Self-monitoring scale was also included. Despite the criticisms of this scale by Briggs _et al_ (1980) it seemed reasonable to attempt to assess the utility of both the total SM score and the scores on the 3 factors determined by Briggs _et al_. The 5-point rating scale version used by Briggs _et al_ was employed in this study in order to facilitate scoring of these 3 factors. It was hoped that scoring the 3 factors developed by Briggs _et al_ would also help to elucidate the correlations found between SM score and the Type A behavioural measures in the last study.

Briggs _et al_ (1980) describe individuals who score highly on the extraversion factor as liking to be the centre of attention and as gaining enjoyment from telling jokes and stories. They found a significant negative correlation between this factor and a measure of shyness ($r=-0.56$, $n=1020$, $p<0.001$). They describe high scorers on the other-directed factor as tense, awkward and inhibited in social situations. These other-directed individuals also tend to be aware of themselves as social objects. To offer some support to this contention Briggs _et al_ report a significant correlation between their other-directed scale and the public self-consciousness subscale of the Self-consciousness scale ($r=0.28$, $n=1020$, $p<0.001$). High scorers on the acting scale report an ability or preference for acting, also often reporting an ability to lie. This factor also correlated significantly, in a negative direction, with the measure of shyness ($r=-0.23$, $n=1020$, $p<0.001$).

Briggs et al propose that none of these subscales of Snyder's SM scale are adequate measures of the dimension originally conceived by Snyder (1974) as Self-monitoring of Expressive Behaviour.

5.2 Method

5.2.1 Subjects and Interview Procedure

Undergraduate students (n=205) taking a first year course in psychology completed a package of questionnaires as part of a course requirement. Subjects from this group were approached to take part in the videotaped structured interview (VSI). Interviews were carried out by the author who was trained in the presentation and scoring of the VSI at the Harold Brunn Institute in San Francisco. The interview used in this study was identical to that used in the Recurrent Coronary Prevention Program (see Friedman, Thoresen and Gill, 1981) except that all items and references pertaining to myocardial infarction were omitted (a copy of the interview questions and score sheets are included in appendix B.3 and B.4).

All interviews were scored "live" and then the videotape of the interview was scored again. As no other trained interviewer(s) were available to check on scoring, any subjects whom the author had any doubts about classifying did not have their scores included in subsequent analyses of these data. Of the 95 subjects interviewed, 55 were chosen at random from the group who completed the package of questionnaires. The remaining 40 subjects had extreme Jenkins Activity Scale scores as they had been selected to take part in another experiment. These subjects either had a JAS score of over one standard deviation greater than the sample mean (n=22) or of one standard deviation or less than the sample mean (n=18).

It seemed reasonable to include these extreme scorers on the JAS in this study. A sample of undergraduate university students might be expected to contain less extreme scorers, especially in the Type A direction, than a samples of middle aged employed males, such as have been employed in a number of other studies using the structured interview. This study was particularly aimed at determining the nature of a hypothesized relationship between Type A behaviour and self-awareness. The relationship was initially hypothesized from effects observed in extreme scorers on the JAS. For example the Type A subjects who took part in the treadmill experiment run by Carver et al (1976) had JAS scores in the top 20% of a group of over 800 undergraduate students (see Chapter 3). It was intended that the inclusion of the 55 randomly selected subjects would normalise the distribution of JAS scores sufficiently to allow the valid application of correlational techniques to the data.

5.2.2 Self-report Measures

Scores for the the Type A, Speed and Impatience (SI), and Hard-driving and aggressive (HDA) subscales of the Jenkins Activity Scale for Health Prediction (JAS) were computed (using the weighted scoring system-Jenkins, 1979). Scores for the Job Involvement scale were not computed as the majority of subjects had only ever been full-time students. Subjects also completed the short form (7 items) of the Bortner Type A scale (Bortner, 1969) and the Vickers Type A scale (Vickers, 1973; a copy of this scale is included in appendix B.1).

Scores on the private and public self-consciousness and social anxiety scales of the Self-consciousness Scale (SCS) (Fenigstein, Scheier and Buss, 1975) were computed for each subject. Subjects also completed the Self-monitoring of expressive behaviour Scale (Snyder, 1974). Instead of the original true/false format as used by Snyder, subjects were asked to rate themselves on a 5-point scale (not at all true of me-very true of me) as used by Briggs, Cheek and Buss (1980). This scale was scored to yield both Snyder's original total self-monitoring score and the three subscales reported by Briggs *et al* which they named extraversion, other-directedness and acting (a copy of the revised SM scale is included in appendix B.2).

5.2.3 Interview Self-awareness

Subjects were asked six questions at the end of the VSI, about aspects of their experience of being self-aware. These questions were outlined in section 5.1. They were presented as though part of the interview, with video equipment and studio lights still operating. If subjects failed to understand a question, clarification of its meaning was kept (wherever possible) to restatement of the question. All questions were scored as "Yes" = 1, "Undecided" = 2, or "No"= 3. Where the subject could not answer a question, for example, those subjects who professed to have no insecurities could not answer questions 1 and 2, this was coded missing.

5.2.4 Validation of the VSI

Twelve months after the original interviews were carried out for this study and after the study was run, it became possible to have 10 interview videotapes scored by an experienced interviewer. Mrs. N. Fleischmann, chief interviewer for the Recurrent Coronary Prevention Project at the Harold Brunn Institute in San Francisco rescored 10 videotaped interviews, selected at random from the interview tapes of subjects who took part in this study.

The correlation between the author's original scoring and Mrs Fleischmann's scoring of these 10 videotaped interviews was r=0.91 (Spearman Rank-order Correlation Coefficient). It must be stressed, however, that the mean difference between scorers was 38 points. It is also a correlation between total interview scores which fails to take into account that different Type A indicators (or characteristics) might be checked by the scorers to arrive at similar final scores. This did happen in 2 of the interviews. These scoring differences appeared to have been exacerbated by the fact that some behavioural indicators, such as facial and postural tension, are extremely difficult to score from video-tape. This problem was largely to blame for scoring differences in three of the interviews.

Despite these scoring differences, the author's interview presentation was validated by Mrs. Fleischmann who believed that his interview procedure was eliciting Type A behaviours in this sample of Australian students. From this brief validition check it seems unlikely that any subject was greatly mis-scored in this study. It is obviously impossible to say whether the pattern of Type A behaviour observed in these subjects is related to increased risk of coronary heart disease.

5.3 Results

5.3.1 Measures of Type A Behaviour

Normative data for all measures used in this study are presented in Table 1. Self-report data are presented for all subjects as well as structured interview data for the 95 subjects who took part in that procedure. Out of this selected sample of subjects, 47 had JAS Type A scale scores of one standard deviation, or greater from the sample mean. Only 40 of these subjects had been specifically selected by this criteria (as mentioned in the method section) however. The fact that the selected sample contains 40 subjects who were selected for their extreme scores on the JAS Type A scale, has affected the nature of the distribution of scores on that scale. The

Table 1: Interview and Questionnaire Scales Normative Data

	Surveyed Population			Selected Sample		
	Mean	SD	N	Mean	SD	n
VSI	--	--	--	143.6	78.7	95
<u>JAS Subscales</u>:						
Type A	220.2	63.0	205	212.2	75.5	95
Speed & Impatience	168.2	54.4	205	166.6	57.3	95
Hard-driving, Aggressive	109.4	27.4	205	106.5	29.5	95
<u>Vickers</u>	27.0	10.3	205	28.5	10.5	95
<u>Bortner</u>	25.7 (1)	3.7	205	25.6	3.4	95
Age	19.2	4.3	201	20.5	5.7	93

(1) There was a significant difference between males (Mean=24.6) and females (Mean=26.2) for Bortner scale scores (F=9.63, df=1,202, p=0.002).

means for the surveyed population (220.2) and the selected sample (212.2) are similar. The selected sample exhibited a somewhat greater dispersion of scores with the standard deviation for the population being higher (75.5) than the standard deviation for the surveyed population (63.0). This is to be expected given the inclusion of a higher proportion than normal, of extreme scorers on the JAS Type A scale.

The greater dispersion in the distribution of Type A scores does not appear to be reflected in the distribution of scores on the other measures of Type A behaviour. The means and standard deviations are very similar in the selected sample and surveyed population for each of the remaining Type A measures (Table 1).

Analyses to investigate the possiblility of sex differences affecting scores on the Type A measures indicated that the only measure significantly affected by sex of subject was the Bortner Type A scale. Females scored significantly higher on this scale (in the Type A direction) than males (F=9.63, df=1,202, p=0.002).

The correlation matrix for all measures of Type A behaviour is presented in Table 2. The self-report measures of Type A behaviour correlate only moderately with the structured interview (VSI) measure. The JAS Type A and SI scales correlate significantly with the VSI (r=0.38, n=95, p<0.001) but these correlations account for less than 15% of variance common to both measures. It is the Vickers Type scale that shows the best correlation with the VSI ($r=-0.42$, $n=95$, $p<0.001$). The Vickers scale also correlates moderately well with the JAS Type A ($r=-0.45$, $n=205$, $p<0.001$) and HDA ($r=-0.52$, $n=205$, $p<0.001$) scales (the Vickers scale scores in the opposite direction to the other Type A scales, with a low score being indicative of Type A behaviour).

Table 2: Measures of Type A Behaviour: Interview and Questionnaire Scales Correlation Matrix

Measures	2	3	4	5	Bortner Scale
VSI	.38+	.38+	.35+	-.42+	.25*
JAS Subscales:					
2. Type A		.56+	.56+	-.45+	.43+
3. Speed & Impatience			-.07	-.16*	.31+
4. Hard-driving, Aggressive				-.52+	.24+
5. Vickers					.16*

Note-All correlation coefficients (Pearson product-moment) are presented.

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

Intercorrelations between the JAS scales are reasonable with moderate correlations between the Type A scale and the SI and HDA scales ($r=0.56$, $n=205$, p<0.001). The Bortner Type A scale appears to be the least useful of the self report measures of Type A behaviour as, although it correlates moderately well with the JAS Type A scale ($r=0.43$, $n=205$, $p<0.001$; this is a better correlation than the $r=.33$ reported in chapter 4). The Bortner scale correlates only poorly with the VSI ($r=0.25$, $n=95$, $p<0.01$) and to about the same degree with the SI and HDA subscales of the JAS as was reported in chapter 4. Correlations between the subscales of the JAS are very similar to those reported in the last chapter.

5.3.2 Measures of Self-awareness

The pattern of correlations between the sub-scales of the self-consciousness scale is very similar to that reported in chapter 4 (see Table 3). Intercorrelations between the subscales of the SM scale tended to support the conceptualization of these scales presented by Briggs _et al_ (1980). The extraversion and other-directed sub-scales correlated significantly with the acting subscale ($r=0.41$, $n=205$, $p<0.001$ and $r=0.27$, $n=205$, $p<0.001$) but failed to correlate significantly with one another. All of these subscales correlated well with the total SM score (Table 3). The only subscale of the SM scale which shows any promise as a measure of self-awareness is the other-directedness scale. This measure correlates moderately with the public sub-scale of the Self-conscious scale ($r=0.40$, $n=205$, $p<0.001$).

Table 3: Correlation Matrix of Interview and Self-report Measures of Self-awareness

Self-awareness Measures	1	2	3	4	5	6	SM total
SCS Subscales:							
1. Private		.56+	.29+	-.18*	.19*	.18*	.13*
2. Public			.48+	-.19*	.40+	.09	.19*
3. Soc. Anx.				-.58+	.15*	-.30+	-.24+
SM Subscales:							
4. Extraversion					.09	.41+	.56+
5. Other-dir.						.27+	.74+
6. Acting							.68+
Interview Questions:							
1. (n=84)	-.10	-.23*	-.17	.19*	-.18*	.10	-.05
2. (n=82)	.17	-.01	-.13	.23*	.11	.09	.13
3. (n=93)	-.03	-.13	-.11	.03	-.04	.26*	.14
4. (n=80)	.05	.17	-.01	.02	.03	-.05	-.00
5. (n=93)	-.11	-.14	.00	-.16	-.31+	-.07	-.28*
6. (n=89)	.07	-.12	-.11	-.00	-.07	-.07	-.01
ISA (1) Scale: (n=82)	.01	.00	-.06	.07	-.02	.02	.03

(1) Self-awareness scale computed from interview self-awareness items 1 and 2

Note-All correlation coefficients (Pearson product-moment) are presented. Analyses on n=205 Ss except where otherwise indicated.

* p<.05 + p<.001

Correlations between the self-report measures of self-awareness and the self-awareness questions appended to the interview were generally poor. None of these questions correlated significantly with private self-awareness or with social anxiety. Question 1 correlated significantly with public self-consciousness, rather than with private SC as was expected ($r=-0.23$, $n=84$, $p<0.05$). From this low correlation, it appears that individuals who are high in public self-consciousness may be more ready to admit often to being aware of their insecurities. Low but significant correlations were found between the extraversion scale and self-awareness question 1 ($r=0.19$, $n=84$, $p<0.05$) and question 2 ($r=0.23$, $n=84$, $p<0.05$). These correlations tend to be too low to allow meaningful interpretation. A finding which was interpretable and which gives some evidence of the validity of interview self-awareness question 5 was that it correlated significantly with the other-directed scale of the SM scale ($r=-0.31$, $n=93$, $p<0.001$). This correlation indicates that those high in other directed-ness tend to prefer to keep a close check on their behaviour in social situations. The acting scale correlated significantly with question 3 ($r=0.26$, $n=93$, $p<0.05$). This correlation indicates that those who are high in acting tend to report not keeping close check on their work.

In order to investigate the possibility of these interview self-awareness items clustering together on some dimension of self-awareness, which might facilitate their being combined into a more reliable measure, the data from these items was factor analysed (these data met the criteria for application of the factor analysis procedure as outlined in chapter 4). Data on private and public self-awareness and the from other-directed scale of the SM scale were also included in this analysis as validated points of reference for measures of self-awareness. A principle components factor analysis with varimax rotation (SPSS; Nie et al, 1970) yielded 2 factors with eigenvalues greater than one (see table 4). Only interview self-awareness questions 1 and 2 yielded loadings greater than 0.3 on the first of these factors. Private and public self-consciousness and other-directedness yielded loadings greater than 0.3 on the second of these factors. Despite the fact that the validated measures of self-awareness failed to load on factor 1, data from the interview self-awareness items which loaded strongly on this factor were assessed as a self-awareness measure. Each subject's score on these items was multiplied by the item's loading on factor one and the resultant scores were summed to yield a single score. This score was included in the correlational analyses reported in table 3.

As is obvious from table 3, subjects' scores on this scale were not related significantly to any other measure. Thus this procedure does not, as was suspected from the factor structure (reported in table 4), appear to provide any improvement in the ability of the interview self-awareness items to assess self-awareness.

Table 4: Factor Analysis of Interview Self-awareness Questions and Measures of Self-awareness

Factors	1	2
Eigenvalues	1.64	1.30
% variance	42.2	33.3
<u>SCS</u> <u>Subscales</u>:		
Private	-	.633
Public	-	.726
<u>SM</u> <u>Subscale</u>:		
Other-dir.	-	.379
<u>Interview Questions</u>:		
1.	.733	-
2.	.851	-
3.	-	-
4.	-	-
5.	-	-
6.	-	-

Note-Varimax rotation with Kaiser normalization (SPSS). This table presents all factors with eigenvalues greater than 1 and all factor loadings greater than 0.3.

5.3.3 Self-awareness and Type A Behaviour: Self-report Measures

The correlations between the self-report measures of Type A behaviour and self-awareness are generally low (table 5). Although there are a number of significant correlations, the largest of these being between the Bortner Type A scale and public self-consciousness ($r=0.20$, $n=205$, $p<0.01$). All of these correlations represent very low levels of variance common to the Type A behavioural and self-awareness measures.

There was no significant correlation between the JAS Type A scale and private self-consciousness for the whole sample but these measures correlated significantly for females ($r=0.15$, $n=140$, $p<0.05$). This was the only measure employed in the present study for which a significant correlation was found for one subject sex and not the other.

5.3.4 Self-awareness and Type A Behaviour: Interview Measures

The VSI measure of Type A behaviour correlated with private self-consciousness ($r=0.22$, $n=95$, $p<0.05$) but failed to correlate significantly with any of the other self-awareness measures (see table 5).

Although there were no significant correlations between the interview self-awareness questions and the VSI Type A measure, there were some significant but low, correlations between these questions and the self-report

Table 5: Correlations Between Type A and Self-awareness Measures

	VSI	JAS Scales			Vickers	Bortner
	(n=95)	A	SI	HDA	A	A
SCS Subscales:						
Private	.22*	.15!	.10	.11	-.01	.07
Public	.03	.01	.05	.05	.13*	.20*
Soc. Anx.	-.07	-.12*	-.10	-.05	.14*	-.02
SM Subscales:						
Extraversion	.09	.20*	.17*	.09	-.21*	.07
Other-dir.	-.12	-.04	.07	-.21+	.20*	.11
Acting	.03	.10	.21+	-.07	.06	.01
(Total SM)	-.05	.03	.19*	-.18*	.14*	.12*
Interview Questions:						
1. (n=84)	-.02	.13	.17	.01	-.09	-.08
2. (n=82)	.12	.15	.16	.12	-.12	.17
3. (n=93)	.03	-.20*	-.03	-.23*	.25*	-.11
4. (n=80)	.05	.12	.07	.15	-.17	.24*
5. (n=93)	.04	-.00	-.05	-.07	.02	-.27*
6. (n=90)	-.01	-.23*	-.14	-.07	.01	.02

Note-This table presents all correlation coefficients (Pearson Product Moment). All analyses are on n=205 Ss unless otherwise indicated.

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

measures of Type A behaviour. Question 3 correlates significantly with the JAS Type A ($r=-0.20$, $n=93$, $p<0.05$) and HDA ($r=-0.23$, $n=93$, $p<0.05$) scales, and with the Vickers scale ($r=0.25$, $n=93$, $p<0.01$). These correlations indicate that there is a relationship between Type A behaviour and "liking to keep a close check on your work (or studies)". The JAS Type A scale also correlated significantly with question 6 ($r=-0.23$, $n=90$, $p<0.05$). This correlation indicated that there is a relationship between Type A behaviour and a tendency to wonder what the interview procedure was about while undergoing it. No other consistent patterns of correlations were found between the self-awareness questions and the self-report measures of Type A behaviour.

All self-report measures of Type A behaviour and self-awareness (including the SM sub-scales) were factor analysed using a principle components analysis with varimax rotation (Statistical Package for the Social Sciences-Nie et al, 1970). The VSI Type A score and interview self-awareness questions were not included in this analysis due to the greatly reduced number of subjects that would have been available to such an analysis (n=80 instead of n=205). It would not have been reasonable to apply the factor analysis procedure to data on 18 variables from only 80 subjects. The SM scale total score was not included in this analysis as data from the 3 subscales which were computed from the same raw data, had been included. The factor loadings for the 3 factors with eigenvalues greater than one are presented in table 6.

Table 6: Factor Analysis of Questionnaire Scales

Factors	1	2	3
Eigenvalues	2.30	1.87	1.34
% variance	37.1	30.3	21.6
JAS Subscales:			
Type A	-	.51	-
SI	-	-	-
HDA	-	.94	-
Vickers	-	-.55	-
Bortner	-	-	-
SCS Subscales:			
Private	.60	-	-
Public	.89	-	-
Soc. Anx.	.43	-	-.66
SM Subscales:			
Extraversion	-	-	.77
Other-dir.	.46	-	-
Acting	-	-	.60

Note-Varimax rotation with Kaiser normalization (SPSS). This table presents all factors with eigenvalues greater than 1 and all factor loadings greater than 0.3.

The private, public and social anxiety subscales of the Self-consciousness scale and the other-directed subscale of the SM scale load on the first factor. This appears to be a self-awareness factor with an emphasis on public rather than private self-awareness as public self-awareness loads most strongly. The second factor obviously represents the Type A behavioural dimension with an emphasis on hard-driving aggressiveness. It is interesting to note that, while the HDA subscale of the JAS loads most strongly on this factor, the SI subscale and the Bortner Type A scale have loadings of less than 0.3. Factor three may be seen to represent a dimension of extraversion as this scale and the acting subscale load on it. The social anxiety subscale of the SCS also loads on this third factor but in a negative direction.

There is little basis for comparison between the results of this factor analysis and the one reported in chapter 4 (table 3). This is mainly due to the inclusion of the SM scale subscales developed by Briggs et al (1980) which were not able to be computed in chapter 4. The strong factor 1 reported in chapter 4 which appeared to represent the Type A behavioural dimension was not replicated in this study. The only Type A factor found here (factor 2) appears to represent a hard-driving, aggressive dimension of the A Type pattern which was found in factor 4 of the pilot study (reported in chapter 4). From the present analysis, only the other-directed subscale of the SM scale loads on the dimension of self-consciousness which the private, public and social anxiety subscales of the of the self-consciousness scales all load on (table 6). The sub-scales of the SM scale load on two distinct factors in the present analysis, supporting the contention that the original SM scale was multi-dimensional (see Briggs et al, 1980). Thus the use of the total SM scale score in the pilot study may have affected the factor structure reported in chapter 4 due to its multidimensional nature.

5.4 Discussion

5.4.1 Measures of Type A Behaviour

In the light of previously reported research data, the JAS scales were not expected to correlate highly with the structured interview. Jenkins, (1978) has reported that the JAS misclassifies up to one third of respondents when compared to interview classification and Chesney et al (1981) have reported even lower correlations between their structured interview and JAS scale scores than found in this study. Chesney et al reported data from a sample of 384 employed male subjects. They found correlations between the interview and JAS Type A scale of $r=0.26$ between the interview and the JAS speed and impatience scale of $r=0.23$ and between the interview and the JAS hard-driving and aggressive scale of $r=0.22$ (all correlations significant at the 0.001 level).

The fact that Chesney et al found lower correlations than were found in this study between the structured interview and JAS subscales, is surprising as both measures were developed for samples of working males as used in their study and not for student samples as used here. Forty of the subjects interviewed in this study had been selected for their extreme (one standard deviation or greater) scores on the JAS Type A scale. Although this may have artificially increased correlations involving the JAS Type A scale, it should also have served to enhance the similarity of this sample to the sample used by Chesney et al. Their sample of middle aged men might be expected to have a higher proportion of extreme Type A scale scorers than a randomly selected student sample. Friedman, Thoresen and Gill (1981) have suggested that A Type behaviour represents a developing pattern and that, in particular, the hostility component of Type A behaviour may tend to become more extreme as these individuals age.

The magnitude of correlations between the VSI and the self-report measures employed in this study must be of concern to users of such instruments. These instruments all purport to be valid and reliable instruments for the assessment of Type A behaviour. The correlations between the self-report measures and the structured interview in the present study and as reported by Chesney et al (1981) cast grave doubts upon the utility of these self-report instruments however. Chesney et al (1981) concluded from their data (which are essentially replicated by the data reported here) that self-report measures may not yield valid assessments of Type A behaviour. They advise that Type A-B classification of subjects by the use of self-report measures should be treated as tentative.

Chesney et al (1981) used the structured interview as the standard for Type A behavioural assessment and correlated the self-report measures with it in their study. In the present study the Bortner Type A scale showed the lowest correlation with the VSI of all the self-report measures. This correlation accounts for only a little over 6% of variance common to both measures. Price and Clarke (1978) have reported a much larger correlation (r=0.47) between the Bortner scale and an unweighted JAS total score (using a student sample). This much more acceptable correlation may be due to the fact they employed a weighted scoring system for the Bortner scale (see Bortner, 1969), which was not used in the present study. The poor performance of the Bortner scale in this study seems unlikely to be due soley to a failure to employ this weighted scoring system, however, as Ray and Bozek (1980) have observed that weighted scoring systems for psychometric instruments are often of little value. Grave doubts must be held about the utility of the Bortner scale as a method for assessment of Type A behaviour after its very poor showing in the present study.

The Vickers Type A scale performed well in this study. It correlated moderately well with the VSI, being the best of all the self-report measures in this respect. It also correlated moderately well with the JAS Type A and hard-driving and aggressive scales. These data and the brevity and ease of application of the Vickers scale make it a very appealing instrument. It has been employed in a study of post-myocardial infarction patients (Byrne, 1981), of work stress amongst fire-fighters (Innes and Clarke, 1982) and in a study of impulsiveness and Type A behaviour (Innes, 1980). These studies have not assessed the reliability and validity of this measure however. Until this scale is validated it must be considered to show promise of usefulness, especially as a large scale screening instrument, but obviously should be "backed up" by the use of a proven method for Type A behavioural assessment (see Pittner and Houston, 1980).

It would be convenient to presume that only shortcomings in the self-report measures are to blame for the disappointing level of correlations found between the VSI and self-report measures but the validity of the VSI used in this study, must also be questioned. Well controlled studies in the USA that have used this interview procedure have very often used a number of trained interviewers in attempting to produce accurate assessment of Type A behaviour (eg. Chesney et al, 1981). The interview assessments of Type A behaviour by the author could not initially be validated in this way as no other trained interviewers were available. A further problem with the VSI in this study is that it was originally developed for use with middle aged American males and it may not generalize well to a sample of male and female Australian undergraduate university students.

Despite these misgivings, there is support for the notion that the VSI was the best instrument employed in the present study for accurate assessment of Type A behaviour. The structured interview has been used to assess Type A behaviour in a number of studies of university undergraduate students in the USA (eg. Matthews, 1982). Obviously it it has not been used to predict CHD incidence in such subject samples. It does appear, however, that the interview can be used to elicit and assess Type A behaviour in university student subjects. Although no data seem to have been reported for the generalizability of the interview to Australian samples, it has been used in other non-American countries such as Belgium (Kittel et al, 1978). Australian subjects seemed to the author and to an experienced American interviewer (Mrs. N. Fleischmann) to manifest the same Type A pattern of behaviour during the interview as their American counterparts although it is not yet known, whether the Type A behaviour observed in Australian subjects is associated (as it is for American subjects) with increased risk of Coronary Heart Disease.

The results of the reliability check on 10 of the author's videotaped structured interviews also offer some grounds for optimism about the use of this method of Type A behavioural assessment for the sample of Australian university students. This check was carried out by a very experienced interviewer who judged that the author presented the interview items well and that these items did successfully elicit Type A behaviours from subjects. The correlation between the author's original scoring of these interviews and the subsequent check was of a high enough level to inspire some confidence, although this correlation did tend to mask some inconsistencies in scoring (as previously discussed). It would also be wise to avoid making a great deal of this reliability check as it only involved 10% of the original interviews.

Thus, while the interview method appears to be the most valid and reliable method of assessing Type A behaviour employed in the present study, the JAS subscale scores will not be ignored. Despite misgivings about the JAS (and other self-report instruments) expressed here and elsewhere (eg. Jenkins, 1978; Friedman *et al*, 1981; Ray and Bozek, 1980; Ray and Simons, 1982), the JAS is an objective standardized instrument for which reasonable levels of reliability have been reported (eg. Jenkins, 1978; Matteson and Ivancevich, 1980; Jenkins and Zyzanski, 1982). The use of the JAS subscales may also help to elucidate the nature of any relationships that are found between dimensions of Type A behaviour and measures of self-awareness. The Vickers scale was also included in the analyses of the self-awareness data, due to its relatively good level of correlation with the VSI. The Bortner scale has also been included in these analyses. Although grave doubts must be held about its utility as a measure of Type A behaviour, other researchers have expressed confidence in the utility of the Bortner scale as a measure of Type A behaviour (Price and Clarke, 1978).

5.4.2 Measures of Self-awareness

Private self-consciousness (SC) correlated quite well with public SC but rather less well with the social anxiety subscale. The social anxiety subscale did correlate quite well with public SC. This pattern of correlations between the three subscales of the Self-consciousness scale is quite consistent with the original formulation of these scales by Fenigstein, Scheier and Buss (1975). None of these subscales correlated well with the total score on the Self-monitoring (SM) scale.

From the original formulation of the SM scale (Snyder, 1974) the SM total score would be expected to correlate quite well with Self-consciousness scale subscales, especially with public SC (the conceptual bases of these two scales are discussed in chapter 4.1). The SM scale was designed to assess the dispositional concern of individuals for monitoring (or being aware of) their behaviour which was available to public scrutiny (eg. Snyder, 1974; 1979). These low correlations with the SC subscales tend to support the contention by Briggs et al (1980) that the SM scale (total score) is not a good measure of self-monitoring.

The pattern of correlations between the SCS subscales and the SM subscales provides some evidence for the validity of SM subscales as conceptualized by Briggs et al (1980). A reasonably high, negative correlation between the social anxiety (SC subscale) and extraversion (SM subscale) and a moderate correlation between the public (SC subscale) and other-directed (SM subscale) of these measures tend to attest to the validity of the SM subscales. As suggested by Briggs et al (1980), none of these subscales seem to represent measures of self-monitoring (or self-awareness). Although the other directed subscale does appear, from the factor analysis (table 6), to assess some aspect of public SC.

The low general level of correlations between the SCS sub-scales and the interview self-awareness questions casts serious doubts upon the utility of these questions in assessing self-awareness. The lack of correlations between SCS sub-scales and interview questions which would intuitively be expected to be related is also disappointing. For example, social anxiety (SC subscale) and the interview self-awareness question 5 ("Do you like to keep a close check on your behavior in social situations?"), might be expected to be related. The lack of such a relationship gives cause for concern.

Further cause for doubting the utility of these interview questions is provided by the factor analysis (table 4) which indicated that none of these questions loaded on the same factor as the validated public and private SC subscales. The fact that these measures are not related tends to cast serious doubt on the use of these interview self-awareness questions, although, of course, the reliability of single item measures is naturally low.

The composition and presentation of the interview self-awareness questions was rather informal and it was not possible to pilot them to assess their reliability and validity. Obviously single, verbally presented questions about modes of self-awareness must, on principle, be suspected of being unreliable and non-valid. The fact that they could be related to a conventional measure of self-awareness in this study (the Self-consciousness scale) prompted the inclusion of these questions. The low correlations between these questions and the proven SCS subscales may indicate that these questions are of little value.

These questions should not be completely disregarded, however, as they were formulated in an attempt to assess aspects of self-awareness which seemed to be particularly relevant to the dimension of Type A behaviour. If these questions realized this intention to any great degree, they might well be expected to correlate poorly with more conventional, global measures. Thus, although any correlations between the interview self-awareness questions and the measures of Type A behavior must be interpreted with care, they may continue to provide useful information about patterns of self-awareness in Type A and B individuals (discussed in greater detail below).

5.4.3 Type A Behaviour and Self-awareness

The pilot study (reported in Chapter 4) found little evidence for a relationship between these dimensions of Type A behaviour and self-awareness. Although large correlations between measures of Type A behaviour and self-awareness were not found in this study, enough significant correlations between measures of these two dimensions were found to indicate the existence of some association between them. The present study replicated the finding reported by Smith and Brehm (1981), that Type A behaviour and private self-consciousness were related for female respondents but not for males. This correlation was significant but accounts for so little common variance that speculation about precipitating factors is extremely difficult. This finding is a replicable one, even if not particularly powerful, which may help to elucidate the nature of the Type A behaviour pattern as it is manifested in females.

Studies were reviewed in chapter 3 which indicated that there was an association between Type A behaviour and poor psychosocial adjustment in female subjects (eg. De Gregorio and Carver, 1980). Type A behaviour was also found to correlate with neuroticism in a female sample (eg. Waldron, 1980). The present study has replicated the previous finding (eg. Smith and Brehm, 1980) that Type A women are slightly more disposed to being privately self-aware than Type B women. Females also scored slightly higher in the Type A direction than males on the Bortner scale in the present study. Thus it appears that there may be slight differences between males and females in the way in which they manifest the Type A pattern of behaviour. However the magnitude of these findings is not sufficient to determine underlying causal mechanisms or links.

Literature indicating that the VSI is superior to the self-report measures as an instrument for Type A assessment have already been reviewed (see chapter 2.5). It was hoped that the interview would show higher correlations with the self-awareness scales than those found for the self-report Type A measures. The VSI correlated significantly with private self-consciousness. This correlation was slightly higher than that found between the JAS Type A scale and private SC (for female subjects) and adds direct support to the hypothesis of a relationship between these two dimensions. The VSI and private SC measures were significantly correlated for both male and female subjects, providing evidence to support the hypothesis that the dimensions of Type A behaviour and self-awareness are related. The nature of this relationship is not clear from the low correlations found in this study however.

The self-awareness questions appended to the interview are of doubtful validity but do provide some information relevant to the hypothesized relationship between Type A behaviour and self-awareness. The consistent relationship which emerges is between Type A behaviour and question three. As might be expected, Type A subjects are more likely to state that they like to keep a close check on their work. This result fits well with what is known about the high standards for their own performance held by Type A individuals (eg. Snow, 1978; Grimm and Yarnold, 1984). With such high standards Type A individuals may feel a need for relatively frequent monitoring of their work performance level. It may be this aspect of Type A individuals' pattern of self-awareness that produced the positive correlations between various Type A and self-awareness measures.

There was a dual purpose in appending self-awareness questions to the VSI. Firstly, it was hoped that this procedure would take advantage of the challenging interview situation. Secondly, these questions could be aimed at specific aspects of self-awareness in which Type A and Type B subjects were expected to differ and thereby elucidate the nature of any effects which offered support for the hypothesis.

From the correlations involving the interview self-awareness questions and the measures of Type A behaviour it appears that there may be specific aspects of themselves which Type A individuals tend to be aware of. One of these aspects appears to be represented by their reports of liking to keep a close check on their work. This and the other positive correlations between Type A behaviour and measures of self-awareness found in the present study, are inconsistent with much of the body of experimental data, conscerning Type A behaviour and self-awareness (reviewed in chapter 3.8). Previous studies tended to indicate that Type A individuals were less self-aware than their Type B counterparts, although there were also inconsistent results within this literature. Scherwitz _et al_ (1978) found that Type A subjects were more self-involved than their Type B counterparts when challenged by a battery of tasks. There appear to be 2 possible explanations for the inconsistencies within the literature and between the findings of the present study and those reported in the literature.

Firstly, it is possible that Type A individuals might tend to limit their self-awareness to a concern with aspects of themselves which are relevant to maintaining good performance (such as in "keeping a close check on their work"). This fits with the data reported from the present study as a tendency amongst Type A subjects towards being more aware (than Type B subjects) of specific but limited aspects of themselves may have led to the correlations between the dimensions of Type A behaviour and self-awareness. This possibility also appears to be consistent with the Matthews and Brunson (1979) hypothesis that Type A individuals tend to inhibit their attention to events which they see as peripheral to a central task. Self-awareness in the form of frequent checking of work, would surely not be seen by Type A individuals as peripheral to that work but seems more likely to be perceived as an important component of it. Neither is this explanation inconsistent with the findings by Scherwitz et al (1978) who assessed self-involvement by counting the number of self-references made by subjects. These researchers did not assess the nature or context of these self-references however. Thus it is possible that the self-references made by Type A subjects concerned the tasks which they were involved in to a greater extent than the self-references made by Type B subjects.

The second possible explanation of these data, and the explanation given above, are not mutually exclusive. This explanation follows the line of reasoning that patterns of self-awareness amongst Type A individuals may be situationally determined. In relatively non-stressful situations (for example, while answering questionnaires) Type A individuals may tend to be slightly more self-aware than their Type B counterparts (as appears to be the case in the present study). Even in the challenging VSI situation, Type A subjects may still report being self-aware. This appears to be limited to awareness of performance or work relevant aspects of themselves however. It may only be in very stressful, demanding situations such as in a treadmill task (as employed by Carver et al, 1976), that Type A subjects tend to inhibit their self-awareness as being peripheral to the task (and a potential distraction from it, as suggested by Matthews and Brunson, 1979). This fits well with the first explanation and with the proposal by Glass (1977b) that Type A behaviour is elicited from susceptible individuals by environmental challenges. Self-awareness may be seen as less important than the task by Type A individuals, but only when they are sufficiently motivated to assign paramount importance to the task.

Thus a combination of the explanations outlined above, suggests that unstressed Type A individuals may tend to be more self-aware than their Type B counterparts. In response to environmental challenges or stressors they may tend to become less self-aware, or more specifically self-aware of aspects of themselves which are task relevant. This explanation is plausible in the light of the data reported here and elsewhere but leans rather heavily on some very small effects from this study. As previously discussed, this study also employed some unvalidated measures, data from which must be interpreted with extreme caution.

The data reported from the present study do offer some support for the hypothesis that Type A and Type B individuals differ in their propensity to be self-aware.

The nature of such differences, however, may well be too complex to be elucidated by correlational studies like the present one. The specific self-awareness questions have some utility in suggesting future areas for investigation but have necessarily been interpreted with the greatest caution. The course of action which seemed to be most reasonable from the findings reported here was to investigate the effects of manipulations designed to enhance or promote self-awareness, on Type A and B subjects. A developing theoretical framework for such an approach and studies which attempted to employ it, are reported in the following 4 chapters.

CHAPTER SIX

6.1 Introduction

The results of the surveys reported in chapters 4 and 5 offered only limited support for the hypothesis that Type A behaviour was related to the dispositional dimension of self-awareness (as measured by the private and public subscales of the self-consciousness scale). There was some evidence from these survey data to suggest that Type A individuals may be more disposed to being privately self-conscious than their Type B counterparts. From the previous research on Type A behaviour and self-awareness however, (reviewed in chapter 3.8) it seems that Type A individuals might be expected to be less self-aware than Type B individuals. As discussed at the end of the previous chapter, the studies reported in the literature have tended to involve Type A and B subjects in stressful, demanding situations. The studies reported in chapters 4 and 5 made no attempt to stress subjects and also sought only to assess dispositional self-awareness rather than to operationalise or induce self-awareness in subjects.

Thus the next study to be reported here was designed to stress subjects, as Matthews and Brunson (1979) proposed that this might be expected to induce avoidance of self-awareness amongst Type A subjects. This experiment was also designed to attempt to induce self-awareness in subjects. At the time that this study was designed and run the dominant theory concerning the operationalization of self-awareness was Duval and Wicklund's <u>Theory of Objective Self-awareness</u> (Wicklund and Duval, 1971; Duval and Wicklund, 1972). Although it is beyond the scope of this thesis to offer a complete review of this self-awareness theory, Duval and Wicklund's theory must be reviewed in some detail as the manipulation of self-awareness and initial interpretation of data from the experiment reported in this chapter are largely based upon it.

Duval and Wicklund (1972) proposed that the individual's attention was unidirectional in that it could either be directed towards the external environment, or towards the self. They suggested that most of the time attention would tend to be directed towards the environment, but intermittently individuals would be prompted to direct their attention briefly towards themselves, perceiving themselves as they would normally perceive other objects in their environment. Duval and Wicklund named this state "Objective Self-awareness" (OSA) as it involved the individual becoming the <u>object</u> of his or her own attention. The alternative state they named "Subjective Self-awareness" (SSA) as, although when in this state individuals were seen as being predominantly aware of their environment, SSA also allowed individuals to experience feedback from their own actions and physical feelings. Duval and Wicklund proposed that, while in a state of SSA, individuals did not focus on themselves as an object but rather as a source of perception and action.

Duval and Wicklund stressed that the individual was only able to be in one state at a time, and although rapid alternation between OSA and SSA was possible, they believed that individuals tend to spend a great majority of their time in the state of SSA and to experience OSA only briefly when this state was prompted by some environmental stimulus. They suggested that any environmental stimulus which reminded the individual of himself had the potential to induce a state of OSA.

From their early experiments and studies by others Duval and Wicklund (and various associates; see Duval and Wicklund, 1972) believed that manipulations such as replay of an audiotape of the individuals own voice (eg. Ickes, Wicklund and Ferris, 1973), the individual's reflection in a mirror or the presence of a television camera (eg. Duval, Wicklund and Fine, 1971) and the presence of an audience (eg. Sarnoff and Zimbardo, 1961) to enhanced OSA. Although these researchers spoke of "enhancing" or "increasing" OSA, they repeatedly emphasized that they were using these manipulations to increase the proportion of their time which individuals spent in a state of OSA.

Duval and Wicklund proposed that individuals would generally experience the state of OSA as aversive as it induces them to evaluate themselves and their actions. This evaluation would seem likely to make the individuals compare their past and present behaviour with the standards which they hold for it. Duval and Wicklund suggested that the individual in a state of OSA would be motivated to reduce the discrepancy (which he would almost invariably find) between his ideal self and the objective assessment of his real self produced by the state of OSA.

It was proposed by Duval and Wicklund that there were two courses of action open to individuals who experienced OSA. These individuals could seek to reduce the discrepancy which had become apparent to them through OSA by modifying their behaviour, improving their performance, or by some other positive action. Thus OSA could be seen as inducing a drive state. The other possible response to OSA would be to avoid OSA and situations or stimuli which would promote it. Duval and Wicklund proposed that OSA would almost invariably be experienced as aversive, due to the extremely low probability that individuals would see themselves as having achieved all of their standards. They also believed that the self-evaluation involved in OSA would be aversive in itself. Thus they proposed that most people would tend to avoid the state of OSA except in situations which particularly motivated them to enter this state.

In a later expansion of the Theory of Objective Self-awareness Wicklund (1975; 1978) revised these notions of avoidance of the state of OSA. He preferred in later work, to use the term "self-focussed attention" instead of OSA. He suggested that individuals tend to avoid self-focussed attention (or OSA) when there is a negative discrepancy between some aspect of themselves and their expectations (eg. where their performance falls short of their expectation for it). Thus individuals who have performed poorly will be likely to avoid situations which encourage self-focussing of attention. Wicklund also proposed that when a positive discrepancy exists (eg. where performance exceeds expectations) individuals tend to seek out situations which induce self-focussing of attention.

There appear to be two possible areas in which the research on Type A behaviour and self-awareness may converge, to provide conceptualizations for the resistance to being self-aware displayed by Type A individuals in demanding situations. The first of these involves the notion of Type A behaviour as constituting a coping strategy for those who manifest this pattern. Glass (1977b) has hypothesized that Type A behaviour represents the attempts of A Type individuals to gain or maintain, actual or perceived control, over stress producing situations. Type A individuals seem to respond to situations in which their control (actual or perceived) is threatened, with increased effort to exert control. Glass suggests that the hyper-responsiveness, competitiveness and aggravation when thwarted, generally observed amongst Type A individuals, may represent a pattern of coping behaviours. While these behaviours may not actually help Type A individuals to maintain control, they may, according to Glass, both give the impression of control and also help the individual to avoid contemplating the possibility of failure. Thus Type A individuals may employ their style of behaviour, at least in part, to enable them to avoid entertaining thoughts of failure.

Before the design of this first experiment data consistent with this view had been reported, to the effect that Type A individuals were less self-aware in demanding situations than their Type B counterparts. Weidner and Matthews (1978) found that Type A subjects reported less information than did Type B subjects about their physical state during a performance task. Carver, Coleman and Glass (1976) reported that Type A subjects reported less fatigue than Type B subjects on a treadmill exercise despite having, on average, pushed themselves closer to exhaustion. Carver *et al* interpreted their data in terms of the high achievement orientation of Type A subjects, but it is just as easy to imagine that the Type A individuals were not aware of their own fatigue to the extent that the Type B subjects were (see chapter 3.8).

These data had been interpreted by Matthews and Brunson (1979) as supporting the notion that Type A individuals actively inhibited self-awareness as peripheral to, and as a potential distraction from, the task at hand. The hypothesis by Glass tends to suggest that self-focussed attention may be experienced as particularly aversive by Type A individuals, as it involves contemplating the possibility of a failure to achieve their expectations. This possibility of failure must be considered to be particularly salient to Type A individuals as they have been shown (eg. Snow, 1978) to possess very high, and often unrealistic, standards for their own performance.

Another possible explanation (which is not inconsistent with the first) may be found in the self-awareness theory. Wicklund (1975) proposed that all individuals hold standards for their performance and behaviour in a variety of situations. When the individual's level of self-awareness increases this will induce awareness of their present level of performance and of their held standard which is relevant to that performance. Wicklund believes that the individual is motivated to reduce any discrepancy between this standard and their performance level as this discrepancy is experienced as aversive (unless their performance in all aspects exceeds their expectation).

There is ample evidence for the hard-driving, achievement oriented nature of Type A individuals. On a task which required subjects to solve repetitive puzzles, Snow (1978) found that Type A subjects set higher performance standards than Type B subjects. These high standards can also be found amongst more mature Type A subjects. Mettlin (1976) found from a survey of 943 working men, that Type A men expected more rapid career advancement than their Type B counterparts.

Not only do Type A individuals appear to set higher standards of performance for themselves than Type B individuals, but these standards may tend to be unrealistic. After this experiment had been carried out, Grimm and Yarnold (1984) reported that Type A subjects set standards which were unrelated to their prior performance whereas the standards set by Type B subjects tended to be modulated by previous performance outcomes. It seems reasonable to propose then, that Type A individuals hold very high standards for themselves in many situations. In fact it seems likely, as Glass (1977b) has suggested, that these expectations held by Type A individuals may be both unreasonably high and ever escalating.

Thus it may be that Type A individuals will generally experience self-awareness as aversive. Their performance is most unlikely to match, in all respects, the very high standards which they hold for it (see Grimm and Yarnold, 1984). Given the tendency of Type A individuals to set unrealistically high standards for themselves, they are likely to experience the negatively valenced discrepancy between performance and standard suggested by Wicklund (1975), during periods of enhanced self-focussed attention. When Type A individuals are periodically self-aware (a state which they appear to avoid), the discrepancy between their expected and actual performance must often be large enough to help account for the extreme motivation which characterizes such a majority of Type A individuals (eg. Friedman and Rosenman, 1974, Rosenman, 1978).

Thus there are two plausible hypotheses to account for any apparent reluctance of Type A individuals to be self-aware in demanding situations. Matthews and Brunson (1979) hypothesize that Type A individuals actively inhibit self-awareness in the same way as they inhibit attention to other peripheral tasks or events which might interfere with their performance on more important or central tasks. From the literature on self-awareness, the other hypothesis is that Type A individuals may tend to avoid self-awareness as it forces them to compare their performance with the standards which they hold for it. As they may tend to hold excessively high standards (which they are most often unlikely to have fully achieved), this self-awareness is likely to be experienced as aversive and will therefore tend to be avoided (see footnote 1).

These hypotheses are not mutually exclusive. It is conceivable that Type A individuals will avoid self-awareness in demanding situations because it is both distracting and aversive. The experiment reported here was designed to test between these hypotheses and was modelled on a study by Davis and Brock (1975). These researchers had subjects perform a bogus creativity

Footnote 1. In the light of data reported in chapter 5 these hypotheses only appear to be relevant to the avoidance of self-awarenss by Type A individuals in stressful situations. In chapter 5 it was hypothesized that patterns of self-awareness amongst Type A and B individuals were situationally determined. Data reported in chapter 5 indicated that Type A individuals might actually be slightly more self-aware (dispositionally) in non-stressful situations.

task while alone or in front of a video camera (to enhance self-focussed attention). They found that subjects who worked in front of the video camera (they did not differentiate between Type A and B subjects) tended to make more self-references than those who completed the task alone, when they believed that their performance on the task had been good. When subjects believed that their previous performance had been poor, however, they appeared to resist the effects of the video camera manipulation of self-awareness.

In the present experiment Type A and Type B subjects completed a demanding anagram solution task either alone or while being videotaped (to enhance their level of self-awareness). This manipulation of (high or low) self-awareness was expected to affect subjects' performance on the task due to the discrepancy reducing drive that high self-awareness has been found to produce (eg. Wicklund, 1975). It was not possible to make a firm prediction about the nature of the effects of this manipulation on subjects' performance, however, as no information was available about subjects' basal drive level on the task. It was expected that Type A subjects habitually working at (or near), their maximum capacity (eg. Glass, 1977b; Friedman and Rosenman, 1974) would suffer decrements in their performance if made self-aware. Type B subjects might be expected to be working at a slightly lower level (eg. Burnham, Pennebaker and Glass, 1975) and therefore show improved task performance associated with increases in self-awareness.

Both of the previously stated hypotheses would predict that Type A subjects would resist being self-aware during this task and therefore their performance should not be affected by the self-awareness manipulation. The performance of Type B subjects would be expected to be affected by this manipulation however, as there is no reason to expect that they would resist becoming self-aware while being videotaped.

In order to test between these hypotheses a feedback manipulation (similar to that employed by Davis and Brock, 1975) was also introduced, with all subjects being given either positive or negative feedback after the first trial of the two trial task. If Type A subjects actively inhibit self-awareness as peripheral to and a possible distraction from the task (eg. Matthews and Brunson, 1979), these subjects' performance should be unaffected by the manipulation of self-awareness in both feedback conditions. If Type A subjects only inhibit self-awareness due to its potentially aversive nature, then they should have no reason to inhibit it after positive feedback. It would be predicted by this hypothesis that these Type A subjects should only inhibit self-awareness after negative feedback about previous task performance.

The manipulation of self-awareness chosen for this experiment was the use of a video-camera to record the behaviour of subjects engaged in the task. This manipulation has been used to enhance self-awareness successfully in other studies (eg. Davis and Brock, 1975). This videotaping procedure seemed less likely than some other commonly used manipulations like a mirror (eg. Wicklund and Duval, 1971) or an audiotape replay of the subject's own voice (eg. Ickes, Wicklund and Ferris, 1973) to distract subjects from the task. A non-distracting manipulation of self-awareness was essential for this experiment as the Matthews and Brunson (1979) hypothesis was that subjects would inhibit self-awareness due to its being peripheral to, and therefore a potential distraction from the task. A non-distracting, and therefore non-confounding manipulation of self-awareness was required.

6.2 Method

6.2.1 Subjects

Subjects were selected to take part in this experiment from a group of approximately 280 first-year undergraduate university students who took part in large group testing sessions. First-year undergraduate students taking the Introductory Psychology course are requested to make themselves available as experimental subjects for a maximum of 5 hours during the year. From 253 scoreable protocols of the Jenkins Activity for Health Prediction (student form, Krantz *et al*. 1974) completed by students taking an introductory psychology course, extreme scorers were approached to take part in this experiment. Subjects with JAS scores one standard deviation or greater than the sample mean were classed as Type A. Those with scores one standard deviation or less than the mean, were classed as Type B. Eighty-one students had JAS scores sufficiently extreme from the sample mean, to be approached to take part in this experiment.

The author approached all subjects by telephone. Potential subjects were booked to attend the experiment at a suitable time. If they failed to attend they were called again. No potential subject was approached more than twice. Potential subjects were encouraged, but were not coerced or offered any form of inducement to take part in the experiment. Subjects were only told that they would take part in a "cognitive performance task" prior to the experiment but were fully debriefed by mail a few weeks after their participation (when the experiment was finished). The lateness of this debriefing was to ensure that all subjects who took part in the experiment had received no idea of the true purpose of the experiment from friends who had earlier taken part. Data from 60 subjects (32 males and 28 females) were available for analysis. Sixty-three subjects took part in the experiment but two failed to understand instructions and one had to be interrupted during the task due to equipment problems.

6.2.2 Experimental Task

Subjects were presented with 2 trials (or blocks) of anagrams. Twelve anagrams of 5-lettered English words were consecutively presented in each trial. The task was run by computer on a keyboard/display terminal with subjects being required to type in their solution to each anagram on the keyboard. The computer presented each anagram in the middle of the screen, (all anagrams were presented in upper case) for example the first anagram presented in trial one was:

ERWAT

Subjects typed in their solution which automatically appeared beneath the anagram (as shown):

ERWAT

WATER

When they had typed in their solution, subjects pressed the "return" key to have the computer present the correct solution and automatically continue (after 5 seconds) to present the next anagram. Before continuing the computer had presented:

ERWAT	(anagram)
WATER	(subject's solution)
WATER	(correct solution)

Subjects were able to correct spelling and typing errors on their solutions but not on the first letter of each word. Subjects were led to believe that the first letter of each solution was timed and recorded automatically by the computer, so it could not be corrected. They were encouraged, and shown how to correct any errors in the other four letters using the delete key.

Subjects were told that they had 10 seconds after typing the first letter to complete typing the word, to check it, and to press the "return" key. The task was paced by the subjects' own rate of responding. Subjects were given a time limit of 60 seconds for the solution of each anagram. If they had not started to type a solution within that time limit, the computer automatically presented the next anagram. Response latency was taken as the elapsed time between presentation of the anagram and the subjects keying in the first letter of their solution.

All anagrams were created by applying "hard" (displacement of 4 letters) and "easy" (displacement of one letter) letter jumbling formulae developed by Mayzner and Tresselt (1958) to 5 lettered modern American-English words taken from a compilation by Kucera and Francis (1967). As far as possible all anagrams were checked to ensure that they were uniquely soluble. This was subsequently found not to be the case for one anagram in trial one, and for two anagrams in trial two. The anagram of COBRA, presented in trial one, could also be solved as CAROB. This word occurs less than one time in the compilation by Kucera and Francis (1967) of 1.14 million words. In trial two the anagram of FLOUR could also be solved as FLUOR (does not appear in the Kucera and Francis compilation) and the anagram of JAUNT could also be solved as JUNTA (appears 3 times in the Kucera and Francis compilation). A list of anagrams. ordering formulae and frequencies of solutions, as presented in each trial of this task, is presented in Appendix C.1.

6.2.3 Apparatus

Anagrams were presented, response accuracy and latency recorded, and feedback was presented to subjects by a PDP-8 computer through a Digital VT-100 display/keyboard terminal. Video equipment consisting of a tripod-mounted camera, videotape recorder and 24 inch monitor, was present in the room for all subjects.

6.2.4 Experimental Manipulations

1. Self-awareness: Subjects completed the task in front of operating video-recording equipment. They were shown their image on a monitor before starting the task and were able to hear that the equipment was operating during the task, although the monitor was switched off to minimize distraction effects. The camera was situated to the subjects' right, about 5 feet away. Subjects had to turn their head through about 45 degrees to see the camera. Subjects in the alone condition completed the task with this equipment in the room but obviously not operating (the camera was turned away).

2. False Feedback: After the first trial of 12 anagrams subjects were given false feedback by the computer about the speed of their responses. They were told that their responses were either:

(1) 18% faster than average (positive feedback)

or

(2) 18% slower than average (negative feedback)

of a group of undergraduate students who had already completed the task. After reading this feedback, subjects were instructed to initiate trial two of the task. During pre-task instructions subjects were briefed to expect feedback about the speed of their performance.

6.2.5 Procedure

Subjects were taken to the experimental room and seated in front of the terminal as the task was verbally explained to them. Those in the self-aware condition were told that they were being videotaped as the experimenter was interested in the behavior manifested by subjects while they were engaged in the task but did not wish to disturb them by his presence. All subjects were given a cover story to conceal the real reason for, and hypotheses concerning, the experiment. They were told that the experimenter was in the process of developing a new cognitive performance task and that they were providing baseline data as a sample of university undergraduate students.

After subjects were sure that they understood the task a practice anagram was presented with the experimenter present. Once this had been completed the experimenter left the room (turning off the video monitor in the self-awareness condition) and leaving them to start and complete the task alone.

6.2.6 Experimental Design

The experiment presents a completely crossed 2 x 2 x 2 factorial design of subject sex by subject Type (A or B) by Experimental Condition (alone or video), for the data from the first trial. For the second trial the False Feedback (positive or negative) condition was crossed with the existing design. Subjects only saw the experimenter when they were briefed before the experiment and when debriefed afterwards. The task was run by computer to minimise the contamination of self-awareness effects with social facilitation or distraction effects which might be created by the presence of an experimenter. The experimenter was blind to the Typology (A or B) of all subjects. However the Typology of a number of subjects was fairly obvious from their behaviour and demeanour. It was not possible for the author (who was also the experimenter) to be blind to the experimental hypotheses. Three cells of the design had the minimum cell number of 6 subjects (ignoring sex as an independent variable).

6.2.7 Dependent Measures

The performance indices recorded for both trials of the task were latencies for correct responses, number of correct responses, and number of incorrect responses. Data from number of correct and number of incorrect responses are not complementary as most subjects failed to attempt some anagrams within the 60 seconds time limit.

6.3 Results

All performance data from the task were analysed in a series of two-way (for data from trial one) and three-way (for data from trial two) analyses of variance, using the Statistical Package for the Social Sciences "Anova" procedure (Nie, et al, 1970). The independent variable sex failed to approach or attain an acceptable level of significance as a main or interaction effect for any of the indices of performance from trial one or trial two of the task. Sex of subject was therefore excluded from all subsequent data analyses.

A series of two-way analyses of variance were carried out on latencies for correct responses, number of correct responses and number of errors from trial one. The independent variables Type (A or B) and the Self-awareness condition (alone or video) failed to produce significant main or interaction effects on these performance data (see appendix C.2 for details of these analyses).

None of the independent variables (Type, Condition, or False Feedback) attained significance as main effects on trial two performance data (see appendix C.3 for details of these analyses). A significant 3-way interaction effect was found for number of errors made on trial two by Type, Condition and False Feedback (positive or negative) ($F=7.268$, $df=1, 59$, $p=0.009$). This interaction effect is graphed in figure 1 and a breakdown of means, standard deviations and number of subjects in each cell appears in table 1. In trial two after positive feedback Type B subjects made more errors when videotaped than when alone with Type A subjects showing almost an exact reversal of this trend. After negative feedback Type B subjects make more errors when alone than when videotaped (a reversal of the effect after positive feedback) but Type A subjects make about the same number of errors in both conditions.

Table 1: Means, standard deviations and subject numbers for 3-way interaction of number of errors made during trial two by Type, Condition and Feedback

	Positive Feedback		Negative Feedback	
	Alone	Video	Alone	Video
Type A	$\bar{X}=1.83$	$\bar{X}=0.83$	$\bar{X}=1.22$	$\bar{X}=1.29$
	SD=0.75	SD=0.98	SD=1.20	SD=0.95
	n=6	n=6	n=9	n=7
Type B	$\bar{X}=0.50$	$\bar{X}=2.11$	$\bar{X}=1.63$	$\bar{X}=0.57$
	SD=0.54	SD=2.02	SD=2.00	SD=0.79
	n=8	n=9	n=8	n=7

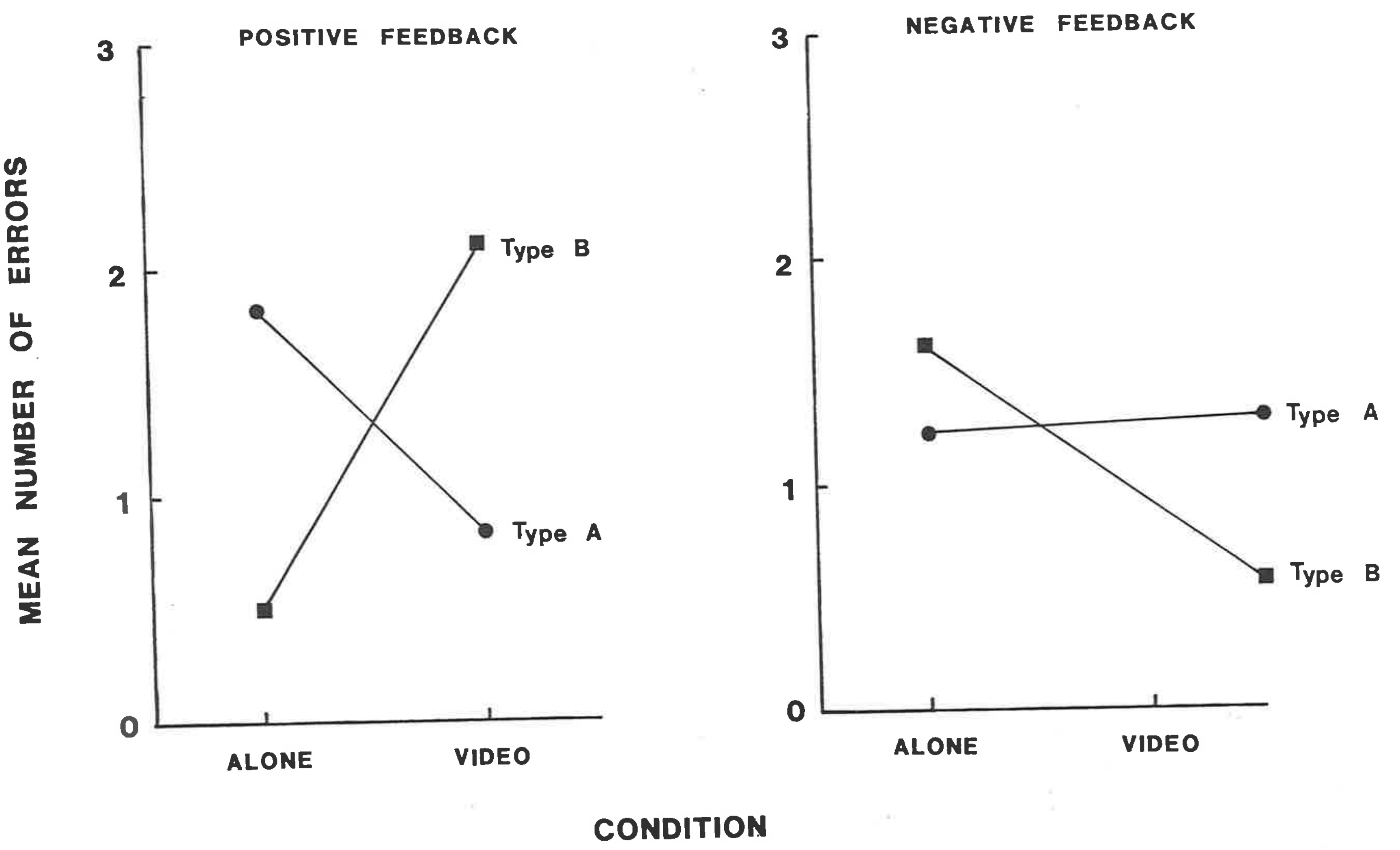


Figure 1: Mean number of errors made on trial two of experiment one by Type, Condition and Feedback

As the 3-way interaction of Type Condition and Feedback on latencies for correct responses data from trial two approached a conventionally acceptable level of significance (F=3.20, df=2, 59, p=0.080), a natural log transformation was carried out to reduce the variability of these data (a procedure advised by Winer, 1971). These latencies data exhibited great variability, as can be seen from the standard deviations (see appendix C.4 for means and standard deviations). The highest standard deviation for a group of subjects in this interaction was 27.2 for Type A subjects who had received positive feedback in the video condition. This was higher than the mean for that group (mean=23.1) and about 4.5 times

Table 2: Means, standard deviations and subject numbers for 3-way interaction of natural log transformed latencies for correct responses made during trial two by Type, Condition and Feedback

	Positive Feedback		Negative Feedback	
	Alone	Video	Alone	Video
Type A	$\bar{X}$=2.18 SD=0.60 n=6	$\bar{X}$=2.77 SD=0.83 n=6	$\bar{X}$=2.44 SD=0.42 n=9	$\bar{X}$=2.54 SD=0.33 n=7
Type B	$\bar{X}$=2.60 SD=0.34 n=8	$\bar{X}$=2.77 SD=0.34 n=9	$\bar{X}$=2.12 SD=0.55 n=8	$\bar{X}$=2.69 SD=0.34 n=7

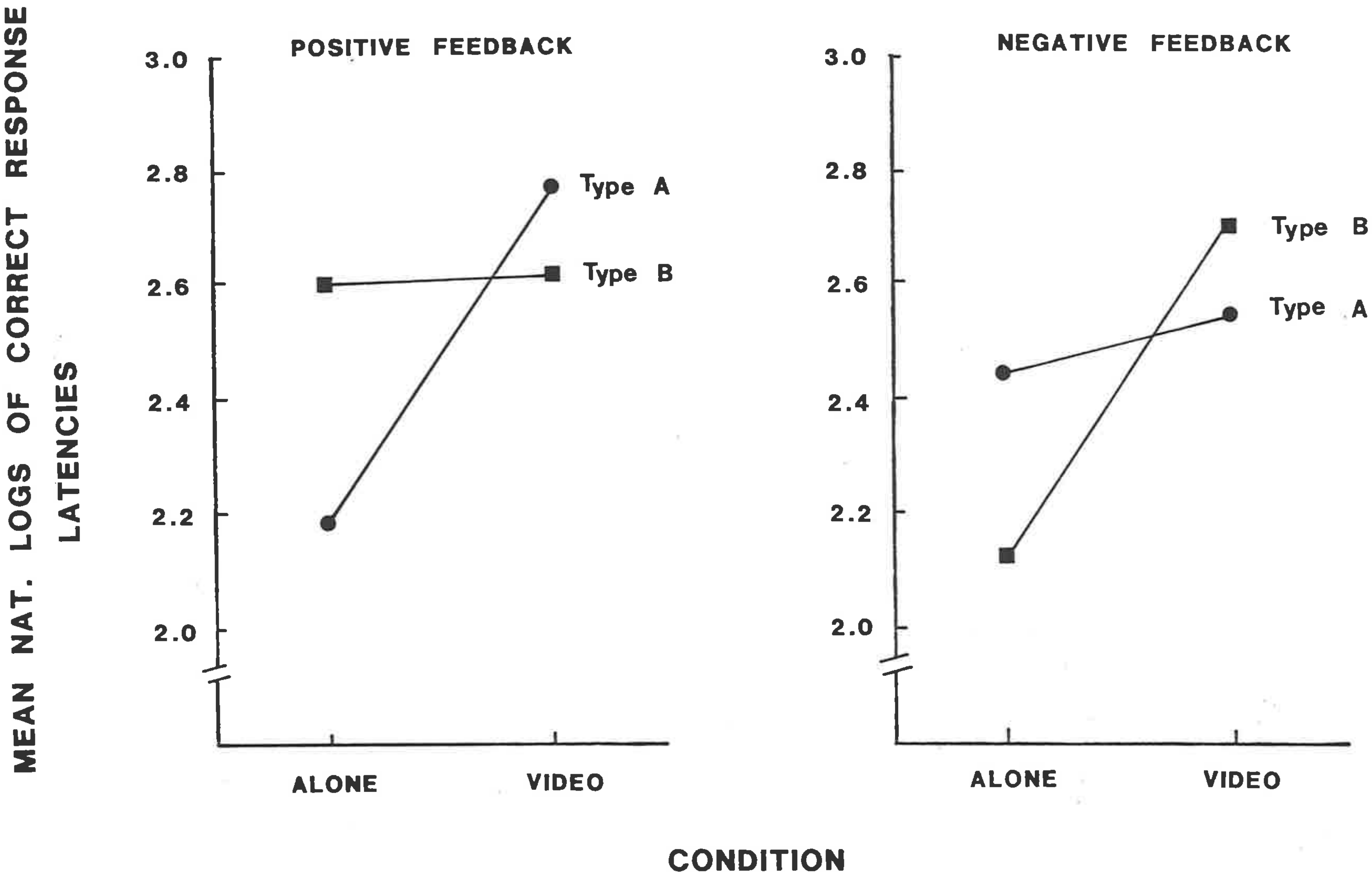


Figure 2: Mean natural logarithm transformed latencies for correct responses made on trial two of experiment one by Type, Condition and Feedback

the next largest group standard deviation of 6.0 for Type B subjects who received negative feedback in the video condition. There was a significant 3-way interaction effect for these transformed latencies data ($F=4.34$, $df=2, 59$, $p=0.042$). This interaction effect is graphed in Figure 2 and means, standard deviations and subject numbers are presented in Table 2 (details of this analysis are presented in appendix C.5). After positive feedback Type A subjects who were alone responded more quickly than those who were videotaped whereas the response latencies for Type B subjects were relatively unaffected by the alone/video condition. Negative feedback appears to make Type B subjects respond in very similar fashion to Type A subjects who received positive feedback, and to make Type A subjects relatively unaffected by the alone/video condition (as Type B subjects had been after positive feedback).

Although Condition failed to reach an acceptable level of significance as a main effect on latencies for correct responses made during trial two, it did approach a conventional probability level ($F=3.28$, $df=1, 59$, $p=0.076$). Analysis of the natural logarithm transformed latencies produced a significant main effect for condition ($F=5.65$, $df=1, 59$, $p=0.021$). Subjects in the video condition responded with a mean average latency of 2.65 (nat. log.) seconds ($SD=0.45$, $n=29$) whereas subjects in the alone condition responded more quickly with a mean average latency of 2.35 (nat. log.) seconds ($SD=0.50$, $n=31$) during trial two.

As significant 3-way interactions were found for number of errors and transformed correct response latencies, the possibility of combining these data types was investigated. A number of procedures designed to combine errors and latencies data to produce an index of subjects' impulsivity (eg. Katz, 1972; Bentler and McClain, 1976) on the Matching Familiar Figures Test (eg. Kagan et al,1964) have been developed. Salkind and Wright (1977) developed a procedure which seemed most applicable to the data from the present experiment. These researchers developed a procedure which enabled raw number of errors and performance latencies data to be combined to yield impulsivity and efficiency scores. High impulsivity was characterized as rapid responding accompanied by many errors while Salkind and Wright characterized efficiency as rapid responding with few errors being made.

Although this procedure was developed for use with data from the Matching Familiar Figures Test, it appeared to be applicable to data from the present experiment. However, a requirement of this procedure was that latencies and number correct data be moderately correlated, at a level of about r=.35 or better (eg. Messer, 1975). The correlation between these two variables in the present experiment was not sufficiently high to apply validly this procedure ($r=-0.23$, $n=60$, $p=0.040$). Separate analyses of the data from Type A and B subjects indicated that, while these variables correlated moderately for Type B subjects ($r=-0.39$, $n=32$, p=0.013) they failed to correlate at all for Type A subjects (r=0.00, n=28, p=0.50). Thus data from Type B subjects exhibit the expected tradeoff relationship between speed of responding and number of errors made (eg. Salkind and Wright, 1977) whereas data from Type A subjects do not exhibit this relationship.

6.4 Discussion

6.4.1 Behaviour of Type A Subjects

The significant effect which the interaction of subject Type, Self-awareness condition and False Feedback had on the number of errors which subjects made during the second trial of the task (figure 1) offers support for the hypothesis that Type A individuals tend to avoid being self-aware when this state is potentially aversive to them. After negative feedback the performance of Type A subjects is unaffected by the self-awareness manipulation, while after positive feedback, when self-awareness is likely to be less aversive there is a facilitation of performance as indicated by number of errors made. The alone/video condition also appears not to affect the speed of performance of Type A subjects following negative feedback. After positive feedback Type A subject take longer to make correct responses in the video than in the alone condition.

When alone, after positive feedback, Type A subjects make more errors and are also faster in making correct responses. This finding is not surprising as

Burnham, Pennebaker and Glass (1975) found that their Type A subjects tended to try to go faster on a simple arithmetic task than Type B subjects. These researchers proposed that although their Type A subjects did not make more errors due to this strategy, this was probably due to the simple nature of the task. Burnham, Pennebaker and Glass suggested that on a more difficult task, Type A subjects would be very likely to make more errors in attempting to respond very quickly. Thus this would appear to be the standard held by normally, or relatively unself-aware Type A subjects. These Type A subjects concentrate on speed at the expense of accuracy. This may be partly due to confidence at the receipt of positive feedback. Even after this feedback that they were faster than average, Type A subjects still appear to choose speed in preference to accuracy.

This effect appears to offer no support for the Matthews and Brunson (1979) hypothesis that Type A subjects will inhibit self-awareness as peripheral to a demanding task. The Matthews and Brunson hypothesis would predict that Type A subjects should also resist the effects of the self-awareness manipulation after positive feedback about previous performance which was not the case. In support of the Matthews and Brunson (1979) hypothesis, however, it could be argued that the task was only experienced as demanding enough to warrant active inhibition of self-awareness by Type A subjects after negative feedback (given that such feedback would suggest the need to attend even more closely to the task in order to perform well). This seems unlikely, due to the fact that an extremely demanding task was employed in this experiment. The task was designed to be cognitively challenging and fast paced. The task required subjects to solve difficult anagrams in a limited time (60 seconds) on unfamiliar equipment (a keyboard/display computer terminal). It was verbally reported as being a difficult task by a number of subjects during debriefing and gave the impression of being so to the experimenter. It would appear to have been more demanding and perhaps more ego involving than the Stroop Colour Naming Task employed by Matthews and Brunson (1979) to prove that Type A subjects inhibited their attention to events which were peripheral to a central task.

From the trial two errors and latencies data it is apparent that negative feedback has induced the Type A subjects to inhibit the self-awareness enhancing effect of the video manipulation, a finding essentially similar to that reported by Davis and Brock (1975). These researchers found a tendency for subjects to resist being made self-aware by a videotaping procedure after they had received negative feedback about previous task performance. Although Davis and Brock did not differentiate between Type A and Type B subjects, it seems possible in the light of data from this experiment, that the effect which they reported may have been due mainly to the Type A subjects in their sample strongly resisting the video self-awareness manipulation (see footnote 2).

It seems that Type A individuals tend to respond in much the way that self-awareness theory predicts that all individuals will react to attempts to enhance their self-awareness (eg. Wicklund, 1975). The performance (in terms of accuracy and speed) of Type A individuals was strongly affected by the manipulation of self-awareness after they had received positive feedback about their previous performance. The performance of these subjects was very similar in alone and video conditions after

Footnote 2. A problem in equating the present study to that carried out by Davis and Brock (1975) is that quite different outcome measures were employed. Davis and Brock counted the number of personal pronouns produced by subjects in a bogus translation task as an index of their level of self-awareness. The present study employed various indices of performance to indicate level of self-awareness through the drive effects which have been postulated to be produced by the state of self-awareness (eg. Wicklund, 1975: 1978).

It is problematic just to presume, as Davis and Brock (1975) did, that the production of personal as opposed to impersonal pronouns is indicative of enhanced self-awareness. It seems just as reasonable to imagine that personal pronouns tend to be produced by those whose ego-involvement has been enhanced. This seems much more likely to be the case after positive feedback and to be unlikely to be the case after negative feedback. It is beyond the scope of this thesis to review the work on ego involvement but a recent review of ego involvement and self-awareness by Greenwald (1982) has proposed that there are "extensive parallels"between the two fields, with enhanced ego involvement being very similar to the state of enhanced self-awareness. Thus the outcome measure employed by Davis and Brock would appear to assess both self-awareness and ego-involvement.

The use of performance data as indices of self-awareness in this study is based upon the contention by Wicklund (1975; 1978) that self-awareness affects task performance via the drive state which it engenders in subjects. Although later researchers have greatly extended this conception of the effect of self-awareness on performance, the basic formulation by Wicklund (1975) that after poor previous performance individuals will endeavour to do better whereas after good previous performance they will not be so motivated continues to be widely accepted (eg. Carver, 1979; Carver and Scheier, 1981).

negative feedback, however, supporting the notion that they were inhibiting self-awareness as potentially aversive. This fits well with theorizing about Type A individuals' interest in performing well and their concern with control.

The significance of the alone versus video manipulation as a main effect on (natural logarithm transformed) latencies data from trial two does not appear to add much to the foregoing interpretations of the 3-way interaction effects. This effect indicates that overall, subjects who complete trial two of the task alone correctly solve anagrams significantly more quickly than subjects in the video condition. This may be due to the existence of some distraction effect attributable to the presence of video equipment. This effect may also be an artifact of the three way interaction effect which Type Condition and Feedback had on correct response latencies (natural logarithm transformed) which has already been discussed. The possibility of the operation of distraction effects on Type B subjects who received positive feedback has already been mentioned. The problem of distraction effects in this experiment is discussed at some length in the next chapter.

The video condition appears to make a different performance standard salient to the Type A subjects who received positive feedback. These subjects show slower latencies than their non-videotaped counterparts and make less than half (on average) as many errors. Wicklund (1975) proposed that enhancing self-awareness makes individuals aware of their performance standards and the level of their previous performance. This appears to be what has occurred for these Type A subjects. They have chosen to work more slowly, most likely in response to a belief (engendered by the false feedback) that they were faster than average. A consequence of this slower responding appears to be that they make fewer errors than their unself-aware counterparts. Thus the video condition appears to make Type A subjects aware of previous good performance but it is not possible to say whether an accuracy standard has also been made salient to them. There is a further discussion of the nature of standards which may be elicited by a video manipulation later in this chapter.

The performance of Type A subjects is relatively unaffected by the self-awareness manipulation after negative feedback. They make about the same number of errors and respond with about the same latencies in both of these conditions. As already discussed, these Type A subjects appear to be resisting the self-awareness manipulation as it would require awareness of their previous poor performance. This may not be the whole story, however, as they make fewer errors and have slower latencies than their counterparts who received positive feedback in the alone condition. Thus the negative feedback appears to have had an effect on their performance. But the addition of further self-awareness (by the presence of a video camera) results in no further change.

The negative feedback appears to have promoted a more conservative approach to the task by Type A subjects. This may well relate to the somewhat ambiguous data which have been reported on Type A behaviour and helplessness after prolonged salient failure. The conclusion by Glass (1977b), that Type A individuals responded to prolonged, salient failure with helplessness effects was criticised in chapter 3 as being poorly supported by experimental data. Perhaps Type A individuals merely tend to respond to salient failure (the failure in the present experiment might be seen as salient but not as prolonged) by adopting a more conservative performance strategy. As Glass suggests, they may continue to work hard in order to maintain control and to avoid thinking about failure but these data suggest that they may also respond in some limited positive way to information about failure. This is a speculative interpretation of the data and it will be discussed further in this and the next chapter with reference to reformulations of self-awareness theory by Carver (1979) and Carver and Scheier (1981).

6.4.2 Behaviour of Type B Subjects

For both latencies and errors data Type B subjects manifested almost exactly the same response to the alone versus video manipulation after negative feedback as Type A subjects manifested after positive feedback. This pattern of performance suggests that subjects in the video condition tend to adopt a more conservative approach to the task (going slower and making less errors) than subjects in the alone condition. It appears most likely that negative feedback increases the motivation of Type B subjects to the extent that they react to the experimental manipulation in similar fashion to Type A subjects. This finding fits with other data which have been reported. Type B subjects have been shown to perform better than Type A subjects following a prolonged and salient failure (Krantz _et al_, 1974), but not following the kind of brief failure manipulated in this experiment. This false feedback manipulation may have engaged Type B subjects in the task to the extent that Type A subjects are normally engaged by demanding tasks, producing a similar pattern of performance data. Houston (1983) has suggested that differences between Type A and B subjects in cardiovascular reactivity only emerge in situations of moderate challenge, as extreme challenge induces Type B subjects to respond in the same manner as Type A subjects. It appears from the present data that this effect may apply to the performance strategies adopted by Type B subjects when highly motivated. Type B subjects who receive negative feedback respond more slowly and make fewer errors when their self-awareness is enhanced (video condition).

Without a much more specific idea of the performance standards which Type B subjects hold it is difficult to explain the effect which the self-awareness manipulation has had on the number of errors which they made after positive feedback. When alone these subjects made relatively few errors but in the video condition Type B subjects made more errors than were made by subjects in any other cell of the design. The response latencies of these subjects were almost completely unaffected by the alone versus video manipulation however. It is difficult to see why Type B subjects should make so few errors when alone, while their counterparts in the video condition made so many errors with both groups taking about the same time (average) to make correct responses. It is possible that these Type B subjects, when self-aware (due to the video manipulation) of their previously good performance (false positive feedback) just tended to relax or get overconfident on the task. Latencies were unaffected by the alone versus video manipulation, however, which renders this explanation unlikely.

A more likely explanation is that Type B subjects were distracted in some way by the presence or operation of video-equipment. Such distraction may not have affected the moderate pace at which they performed on the task but may have caused them to make more errors. It seems unlikely that Type B subjects might adopt a performance strategy or standard in response to the video condition under which they worked no faster but made over 4 times as many errors (on average) than Type B subjects who were alone. Thus some distraction effect must be considered to be a possibility as an explanation for this pattern of data. Many researchers have suggested that Type B subjects generally engage themselves less intensively in tasks than Type A subjects (eg.

Friedman _et al_, 1975; Glass, 1977b; 1980; Matthews, 1982), a factor which has generally been explained in terms of their being less achievement oriented than Type A individuals. If not strongly engaged in the task during the present experiment, it is possible that Type B subjects may have been distracted by the video equipment.

The fact that Type A and Type B subjects produced such markedly differing patterns of errors in response to the manipulation of self-awareness after positive feedback, suggests that these data may be reflecting differences between the performance standards which they hold. The present lack of concrete knowledge about the the nature of such differences makes interpretation of these data a very speculative exercise.

6.4.3 Behaviour of Type A and B Subjects

While the data from this experiment provide strong evidence that the Matthews and Brunson (1979) hypothesis is incorrect, they create other questions. These data offer evidence that Type A and B subjects possess differing performance standards but, as already discussed, give little indication of the nature of these standards. The experiment reported in the next chapter (experiment 2) was desiged to elucidate the nature of these standards.

A point which has not been dealt with in the forgoing discussion, concerns the attempt to combine latencies and errors data to yield a composite score. For most data from performance tasks response latencies and number of errors are negatively correlated. This negative correlation represents a speed versus accuracy trade-off dimension (see Salkind and Wright, 1977). Given the low level of this correlation for the performance data fom this experiment, analyses of the nature of this tradeoff were not applicable. However, the correlation for Type B subjects did represent this dimension, whereas there was a complete lack of such a correlation for Type A subjects.

Thus it seems that other factors must be affecting the performance strategy of Type A individuals to the extent that the expected speed/accuracy trade-off is not apparent. It is not obvious from the present experiment what such factors might be. Naturally it seems reasonable to suspect the performance standards held by Type A subjects as affecting their performance strategy. Developments in self-awareness theory discussed below and the nature of possible drive effects occurring in this and subsequent experiments (as discussed in chapter 8.1) appear to throw some light on this effect.

6.4.4 Later Developments in Self-awareness theory

Some light may be cast on the data from this experiment by a reappraisal of self-awareness and theory (eg. Carver, 1979; Carver and Scheier, 1981) which was published after this experiment was carried out (and so these extensions to self-awareness theory were not taken into account in its design). Carver (1979) offered a more precise theory to account for the cognitive processes of individuals who are self-aware had been available previously. He likens such processes to the way in which self-regulation is operationalized in cybernetic systems. Carver (1979) proposed that individuals who are self-aware assess their recent performance in terms of the standards which they hold for it. This process is similar to the test-operate-test-exit system employed in cybernetics. Self-aware individuals compare their performance to the standards which they hold for it (test), if their performance has not been up to the required standard they attempt to improve it (operate), they then compare their performance with their standard once more (test), and presuming that it is then up to their held standard, they once again return to awareness of the environment rather than the self (exit).

Carver (1979) significantly departs from the Duval and Wicklund formulation of self-awareness theory in proposing that enhanced self-awareness may not always involve self-criticism and therefore will not always be experienced as aversive. Carver believes that many situations can evoke self-awareness in individuals without making any particular behavioural or performance standard salient to them. He suggests that this is particularly evident in those who are made aware of their own bodily feedback or of behavioural recollections as they:

"simply become increasingly cognizant of themselves and their own salient characteristics, much as they might examine any external stimulus." (p.1258).

Carver proposes that, in such situations self-evaluation may only occur in the sense that behaviour or bodily feedback is categorized.

Carver's restructuring of self-awareness theory also lends a great deal more specificity to the nature of standards and the processes by which they become salient to individuals who are self-aware, than was available from previous versions of this type of theory (eg. Wicklund and Duval, 1971; Duval and Wicklund, 1972; Wicklund, 1975). Carver proposed that individuals make probability judgements about the likelihood of them being able to achieve their standard. If this probability is good, individuals will return to the previous "matching-to-standard" procedure and try to achieve their held standard. If they appraise this probability as being low, Carver suggests that individuals will withdraw or avoid awareness of that standard.

This may be what happened to Type A subjects who received negative feedback in the present experiment. Having high performance standards, it is likely that these individuals worked hard at the task in order to be faster than average. Feedback (false) that they had done substantially worse than average may well have induced these subjects to estimate that there was a low probability of achieving their standard. From Carver's theory it is reasonable to expect that these Type A subjects subsequently avoided awareness of their performance standards due to the aversiveness associated with being unable to achieve them. Type B subjects would be expected to possess lower standards for their performance on the task (eg. Grimm and Yarnold, 1984). Therefore the standards held by Type B subjects are unlikely to appear as unattainable to them as the higher standard held by Type A subjects would appear to them (after negative feedback). This is borne out by the data which show that Type B subjects were still responsive to the alone/video manipulation after negative feedback. It was earlier hypothesized that Type B subjects were motivated by the negative feedback, as they manifested a similar pattern of performance in response to the alone versus video manipulation to Type A subjects who received positive feedback. This motivation is to be expected, according to Carver (1979), in individuals who perceive their held standard as attainable.

Thus the data yielded by the first experiment can still be interpreted meaningfully in the light of Carver's more precise formulation of self-awareness theory. Exact information about the performance standards of Type A and B individuals is still lacking in any but the most broad and general terms however. There is evidence that Type A individuals possess higher performance standards than Type B individuals (eg. Mettlin, 1976; Snow, 1978; Grimm and Yarnold, 1984). The only other information is that Type A subjects tend to see speed as more important than accuracy in performance tasks (eg. Burnham, Pennebaker and Glass, 1975).

Thus it is difficult to go beyond the rather speculative interpretation of the pattern of latency and errors data provided earlier, without more specific information about the standards of Type A and B subjects. That is, of course, unless the reverse line of reasoning is adopted and the data from this experiment can be interpreted to provide information about these standards. In such an examination of the data it is firstly neccessary to determine exactly how subjects experientially interpreted the video manipulation. Carver (1979) appeared to agree with previous theory which held that video manipulations induced enhanced self-awareness in subjects by making aspects of their self-presentation salient to them (eg. Duval and Wicklund, 1972; Davis and Brock, 1975). Hull and Levy (1979) have proposed that self-awareness is operationalized in quite a different fashion to that suggested by these previous researchers, although their theory does not seem to throw much light on the use of a video manipulation to enhance self-awareness (see Footnote 3).

<u>Footnote</u> <u>3</u>. Hull and Levy theorized that self-awareness could be operationalized in terms of the level at which an individuals encodes information in their memory. They suggested that self-awareness corresponded to the encoding of information in terms of its relevance to the self (see p. 757). This theory constitutes a major departure from the more traditional theory of self-awareness as it holds that awareness is not a bi-directional phenomenon. This theory has not been supported by the bulk of subsequent research and it appears that it may be encompassed by the existing, (continued next page)

The next experiment was planned to clarify the nature of performance standards held by Type A and B individuals when self-aware and unself-aware. It was not clear from the present experiment, however, how subjects experienced the video manipulation. Davis and Brock (1975) accepted from previous research (eg. Duval and Wicklund, 1972) that a video-camera served to enhance self-awareness. In an earlier experiment Cohen and Davis (1973) proposed that videotaping of subjects was essentially a social facilitation manipulation (see Zajonc, 1965) as subjects expected that someone would study the videotape at some later time. Intuitively it seemed that the video-camera would have both of these effects on subjects. It was seen as having made them aware of their self-presentation as an image was being recorded. This seemed similar to the effect that a mirror might have, especially as they had also seen their image on the monitor before starting the task. They also essentially had an audience during the task as they had been told

Footnote 3 (continued): and much more widely tested theory (eg. Carver and Scheier (1981). It has been suggested (eg. Carver, 1979; Carver and Scheier, 1981) that information must be categorized by individuals as either relevant or irrelevant to themselves. It is the result of this classification which determines whether the information will engender enhanced self-awareness in the individual. If an individual categorizes information as self-relevant, for example "I am being videotaped", they will be likely to experience enhanced self-awareness. Information which is irrelevant to the self however, is not likely to enhance self-awareness. Thus such an interpretation requires that subjects interpret information with reference to memory complexes concerning what is relevant to the self (eg. Carver and Scheier, 1981). The Hull and Levy (1979) theory appears to fit in here, as it may relate to the way in which these memory complexes are encoded.

that the experimenter would be looking at the videotapes later.

In terms of their standards for their performance, it seemed that this video manipulation may have made subjects cognizant of standards relevant to their own self-image and those relevant to the expectations which the experimenter may have of them. The second experiment required subjects to work on a task either alone, in a mirror condition (to make self-image salient) or in the presence of an observer (to make public image salient). As it was possible that further performance data effects might also be difficult to interpret, subjects were asked to make attributions about factors affecting their performance in experiment two. It was hoped that the performance standards which experiment two was designed to elucidate might have a direct effect on subjects' attributions.

CHAPTER SEVEN

7.1 Introduction

The previous experiment (experiment one) was carried out to investigate the effect of a manipulation designed to enhance the self-awareness of Type A and B subjects. These subjects performed on a challenging cognitive task either alone or while being videotaped. A feedback manipulation was also employed, as Davis and Brock (1975) found that subjects (no distinction being made between Type A and Type B subjects) resisted being self-aware when they believed that their previous performance had been poor. This first experiment found that the performance of Type A and B subjects was differentially affected by the self-awareness manipulation after positive feedback. Type B subjects' performance was also affected by this manipulation after negative feedback but the performance of Type A subjects was not affected. Thus these data appeared to support the hypothesis that Type A individuals inhibit self-awareness when they believe that their previous performance has been poor. This experiment offered no support for the Matthews and Brunson (1979) hypothesis that Type A individuals tended to inhibit self-awareness as peripheral to, and as a potential distraction from, challenging tasks.

The performance data from the previous experiment also suggested that different performance standards were made salient to Type A and B subjects by the alone versus video manipulation of self-awareness. There was doubt, however, about the way in which the videotaping procedure had been experienced by subjects.

Carver and Scheier (1981) suggested that manipulations designed to enhance self-awareness (eg. the presence of a mirror) tend to make individuals aware of their privately held standards for their own performance. In public situations (eg. when an observer is present) Carver and Scheier proposed that individuals were aware of public standards for their performance. It is difficult to determine which of these performance standards would have been made relevant to subjects by the video manipulation employed in the previous experiment. Cohen and Davis (1973) have suggested that subjects treat videotaping as a kind of temporally removed observer, knowing as they do, that at some later time someone will study their vidoetape.

This study (experiment two) was designed to manipulate the social situation in which Type A and B subjects were required to perform on a stressful, demanding cognitive task. The video manipulation employed in the last experiment seemed to possess elements of a mirror. It seemed intuitively reasonable to expect that such a manipulation would make aspects of their self-presentation relevant to subjects. This would seem particularly reasonable as the video monitor was on during briefing before the task. Subjects were therefore exposed to an image of themselves for about five minutes prior to the experimental task. Their image on a monitor would seem to be very similar to the image produced by a mirror but would, perhaps, be more novel to them. Thus it was decided to employ a mirror in an attempt to enhance subjects' awareness of self-relevant performance standards (which Carver and Scheier later described as awareness of privately held performance standards) during this second experiment.

The video manipulation was also suspected of having made more social standards for performance relevant to subjects, as they had been told that the experimenter would be looking at the tape at some later time (although no exact time was specified). In the light of the proposal by Cohen and Davis (1973) that video manipulations actually constituted manipulations of social facilitation, this possibility also seemed relevant. Although it is beyond the scope of this thesis to review the literature on social facilitation in any depth, it is necessary to look briefly at differing formulations of this theory which are relevant to the present study.

7.1.1 Social Facilitation Theories

In 1965 Zajonc first proposed a theory to account for previously conflicting findings concerning the effects of the presence of others on an individual's performance. He suggested that the mere presence of others increased drive levels and the tendency to emit dominant responses. This increased drive produced by the presence of others tended to produce improved performance on simple or well learned tasks but individuals showed decrements in their performance on complex or less well learned tasks, according to Zajonc.

Cottrell (1972) provided a reformulation of Zajonc's original theory. Cottrell argued that <u>mere</u> presence was not in itself sufficient to produce increases in arousal. He proposed that the presence of others would only produce increased drive if that presence created evaluation apprehension. There has been support for this proposal (eg. Geen and Gange, 1977), which has been especially related to situations where the presence of another individual is relevant to the subject's expectations of negative outcomes (eg. Weiss and Miller, 1971).

The video manipulation employed in experiment one might have created evaluation apprehension in subjects, especially as subjects were told that the experimenter was interested in their behaviour during the task. Thus the video manipulation might also have served to induce social facilitation effects (see Cohen and Davis , 1973). This prompted the inclusion of an evaluative observer condition in experiment two as it seemed likely to make the standards which subjects believed that others would hold for their performance relevant to them during the task (Carver and Scheier later referred to this as awareness of public performance standards). To enhance awareness of personal standards, however, some subjects completed the task in a mirror condition. The rest of the subjects completed the task alone.

It seemed reasonable to expect that the observer condition would produce similar effects to the video condition employed in experiment one. It was possible that the mirror condition would have a similar effect to the observer (and previously employed video condition) on subjects' performance as Carver and Scheier (1981) suggest that individuals very often hold similar private and public performance standards. It also seemed likely, however, that the presence of an evaluative observer would have a greater effect on subjects' performance than the (relatively unobtrusive) presence of a mirror.

A "false feedback" manipulation was also found to mediate the effects of a social manipulation on the performance of Type A and B subjects in experiment one. A "no feedback" condition was included in this second experiment as no information was available from the first experiment about performance of Type A and B subjects in a situation where feedback was not available to them about previous performance. As anticipation of positive and negative outcomes have been found to be related to social facilitation effects (eg. Geen, 1976; Geen and Gange, 1977) a condition where subjects did not expect feedback also seemed necessary.

Data from subjects' attributions about factors which they felt affected their performance were also collected during this experiment. Such data were intended to provide direct evidence of the nature of standards which Type A and B subjects held for their performance. Subjects were required to complete brief attributions questionnaires after each trial of the task in this experiment. The data from these questionnaires are presented and discussed in chapter 9 along with attributions data from experiment three (which is reported in chapter 8). This structure was adopted in order to simplify the discussion of this chapter, as it led directly to the rationale for the design of chapter 8. Attributions data effects will however, be mentioned briefly (where relevant) in this and the next chapter.

7.2 Method

7.2.1 Subjects

Subjects were selected to take part in this experiment from a group of approximately 250 first-year undergraduate university students who took part in large group testing sessions. From 233 scoreable protocols of the computer scored version of the Jenkins Activity for Health Prediction (weighted scoring of subscales-eg. Jenkins, 1979) completed by students taking an introductory psychology course, extreme scorers on the Type A subscale were approached to take part in this experiment. Subjects with JAS scores of one half of one standard deviation or greater, than the sample mean were classed as Type A. Those with scores one half of one standard deviation or less than the mean, were classed as Type B. One hundred and eighteen students were approached to take part in this experiment.

Less stringent criteria for subject selection, than was employed in experiment 1, had to be employed in this experiment in order to get sufficient subject numbers. It was intended to have at least 350 students complete the JAS, thus giving a large enough pool (about 120) of extreme scorers to take part in this experiment. Due to problems with the organization of testing sessions (which were outside of the author's control), not enough scoreable JAS protocols were available to ensure the required number of subjects if the original selection criterion (1 standard deviation, or greater, extreme from the sample mean on the JAS Type A scale) had been employed. Even with these less stringent selection criteria being employed, the planned subject numbers were not available. This problem of low subject numbers is addressed later in this, and in the next chapter.

Method of approach to subjects, cover story and debriefing procedures were virtually identical to those employed in experiment one. One hundred subjects took part in the experiment but one failed to understand instructions and one failed to finish the task due to equipment breakdown. Data from 98 subjects (32 males and 66 females) were available for analysis.

7.2.2 Experimental Task

Subjects worked on the same task as employed in experiment one excepting that only 10 anagrams (instead of the original 12) were presented in each trial. The anagrams of cobra and roach were omitted from trial one and the anagrams of baton and jaunt were omitted from trial two of the task (see appendix C.1 for the original lists of anagrams used in experiment one). These omissions were carried out for two reasons.

Firstly, the anagrams of cobra (first trial) and jaunt (second trial) were found not to be uniquely soluble, after experiment one had been run. It was feared that subjects who answered with the alternative solutions for these anagrams may have been frustrated by being told that their solutions were incorrect (as the computer did not record subjects' actual solutions it was not possible to check cases where such frustration may have been elicited). Secondly, all omitted anagrams were very difficult and increased the time which subjects spent on the task. Many subjects failed to attempt to answer a number of the more difficult anagrams, thus taking a long time on the task but yielding no performance data. Due to the size of this second experiment and limitations on availability of equipment, the task was shortened by omitting these four anagrams to give subjects time to complete attribution questionaires after each trial while ensuring that it was still possible to run a subject every 30 minutes (on average). If the task had been left at its original length, it would have only been practicable to book one subject per hour.

Equipment was not available for the 100 hours running time which would have been required.

7.2.3 Apparatus

Anagrams were presented, response accuracy and latency recorded, and feedback was presented to subjects by a PDP-8 computer through a Digital VT-100 display/ keyboard terminal. For subjects in the mirror condition a large mirror was also present. The experimental room was partially filled with a variety of cardboard cartons, items of furniture and equipment. This was done to make it look like a store room in which space had been cleared for the experimental equipment. All of the "stores" were chosen to be as uninteresting as possible to avoid distracting subjects from the task (eg. cartons were unmarked and room dividers blocked subjects' view of much of the equipment).

7.2.4 Experimental Manipulations

Most subjects were assigned randomly to one of the following conditions with the last few being non-randomly assigned due to a need to even up cell numbers.

1. Social Condition

(a) Alone: Subjects completed the task completely alone.

(b) Mirror: Subjects completed the task with a large mirror (480 by 760 mm) situated to their left, about 300 to 450 mm away. They only had to turn slightly to see their image.

(c) Observer: Subjects completed the task with an observer seated approximately 1 metre away on their right. The observer was equipped with stopwatch and notepaper which were employed in such a manner as to provide frequent audible reminders of his or her presence to the subject. Female subjects had a female observer present and males had a male observer present. This was done due to previous research which indicated females are more concerned about evaluation by male than by female experimenters (eg. Shrauger and Terbovic, 1976).

2. False Feedback: After the first trial of 10 anagrams some subjects received no feedback about their previous performance. Others were given false feedback by the computer about the speed of their responses. They were told that their responses were either:

(1) 18% faster than average (positive feedback)

or

(2) 18% slower than average (negative feedback)

of a group of undergraduate students who had already completed the task. After reading this feedback, subjects were instructed (by a message on the display screen) to complete attribution questionnaires and to initiate trial two of the task. During pre-task instructions subjects who were to receive feedback were briefed to expect it.

7.2.5 Procedure

Subjects were taken to the experimental room and seated in front of the terminal as the task was verbally explained to them. Those in the observer condition were told that they were being observed as the experimenter was interested in the behaviour manifested by subjects while they were engaged in the task. Subjects in the mirror condition did not have the mirror mentioned to them.

All subjects were given a cover story to conceal the real reason for, and hypotheses concerning the experiment. They were told that the experimenter was in the process of developing a new cognitive performance task and that they were providing baseline data as a sample of university undergraduate students. Subjects were also told that they were in the junk room as it was a "very busy time in the computing centre". This was to be used as an excuse (the room was largely taken up by a number of cardboard cartons and miscellaneous equipment) for the mirror and the close proximity of the observer. If subjects had enquired they were to be told that this was the "junk room" in which enough space had been cleared for running the experiment. The subterfuge was unnecessary, however, as no subject enquired about mirror or observer.

After subjects were sure that they understood the task a practice anagram was presented with the experimenter present. Once this had been completed the experimenter left the room (calling in the observer in the Observer condition) and leaving them to start and complete the task alone. Subjects were asked not to communicate with the observer. They were asked to call out to the experimenter, who would be waiting in the next room, when they had finished the task and all attribution questionnaires).

7.2.6 <u>Experimental</u> <u>Design</u>

The experiment presents a completely crossed 2 x 2 x 3 factorial design of subject sex by subject Type (A or B) by Experimental Condition (alone, mirror or observer), for the data from the first trial. For the second trial the False Feedback (none, positive or negative) condition was crossed with the existing design. Subjects only saw the experimenter when they were briefed before the experiment and when debriefed afterwards. The task was run by computer to minimise the contamination of self-awareness effects with social facilitation or distraction effects which might be created by the presence of an experimenter. The experimenter was blind to the Typology (A or B) of all subjects. However the Typology of a number of subjects was fairly obvious from their behaviour and demeanour. It was not possible for the author (who was also the experimenter) to be blind to the experimental hypotheses.

Three cells of the design had the minimum cell number of 4 subjects (ignoring sex as an independent variable). It was originally intended to run enough subjects to ensure a minimum of 6 per cell but a lack of subjects with extreme JAS scores, problems in contacting a number of subjects and equipment malfunction made this impossible. Low cell numbers is obviously a serious problem for analysis of the data and this is discussed at some length later in this chapter. The performance indices recorded for both trials of the task were the same as those recorded in experiment one.

7.3 Results

All performance data from the task were analysed in a series of two-way (for data from trial one) and three-way (for data from trial two) analyses of variance, using the Statistical Package for the Social Sciences "Anova" procedure (Nie, et al, 1970). The independent variable sex failed to approach an acceptable level of significance as a main or interaction effect for any of the indices of performance from trial one or trial two of the task. Sex of subject was therefore excluded from all subsequent data analyses.

A series of two-way analyses of variance were carried out on latencies for correct responses, number of correct responses and number of errors data from trial one. The independent variables Type (A or B) and the Social Condition (alone, mirror or video) failed to produce a significant interaction effect on the performance data (see appendix D.1 for details of these analyses). Social Condition produced a significant main effect on the number of correct responses made by subjects during trial one of the task (F=9.87, df=2, 97, p=0.017). Subjects made a greater mean number of correct responses in the mirror (8.41) and observer (8.30) conditions than they made in the alone (7.47) condition.

The independent variables (Type, Condition, and False Feedback) failed to combine to produce significant interaction effects on trial two performance data (see appendix D.2 for details of these analyses). However tables of means and standard deviations for the (non-significant) interaction of the independent variables on number of errors (table 1) and latencies for correct responses (table 2), are provided to allow direct comparison with the significant effects reported from experiment one chapter 6). Comparable means from experiment one are included in these tables. Means for the video condition employed in experiment one are given below means for both social conditions employed in the present experiment (mirror and observer).

False feedback produced a significant main effect for number of errors made during trial two (F=3.96, df=2,97, p=0.023). Subjects made a greater mean number

Table 1: Means, standard deviations and subject numbers for the non-significant interaction of number of errors made during trial two by Type, Social Condition and Feedback.

	Type A	Type B
	M SD n	M SD n
Alone		
No Fbk.	1.3; 2.5 (4)	1.0; 0.9 (8)
Pos. Fbk.	1.4; 1.7 (5) (1.8)	0.7; 0.8 (6) (0.5)
Neg. Fbk.	2.8; 1.9 (5) (1.2)	1.7; 1.5 (6) (1.6)
Mirror		
No Fbk.	0.6; 1.3 (5)	0.9; 1.2 (7)
Pos. Fbk.	0.4; 0.6 (5) (0.8 vid.)	1.3; 1.4 (6) (2.1 vid.)
Neg. Fbk.	0.8; 1.3 (5) (1.3 vid.)	0.8; 1.2 (6) (0.5 vid.)
Observer		
No Fbk.	0.4; 0.6 (5)	0.3; 0.8 (6)
Pos. Fbk.	0.8; 0.5 (4) (0.8 vid)	0.5; 0.6 (6) (2.1 vid.)
Neg. Fbk.	1.8; 1.7 (4) (1.3 vid.)	2.0; 2.4 (5) (0.5 vid.)

Note. Presented in this table are:
mean; standard deviation (n)
for each cell. Corresponding means from expt. 1 are presented below expt. 2 means in parentheses.

Table 2: Means, standard deviations and subject numbers for the non-significant interaction of latencies for correct responses (raw data) made during trial two by Type, Social Condition and Feedback.

	Type A M SD n	Type B M SD n
Alone		
No Fbk.	7.9; 5.1 (4)	9.6; 3.3 (8)
Pos. Fbk.	8.2; 3.4 (5) (9.95)	11.0; 4.5 (6) (14.1)
Neg. Fbk.	10.8; 7.1 (5) (12.3)	8.8; 5.2 (6) (9.3)
Mirror		
No Fbk.	7.8; 5.2 (5)	10.5; 5.7 (7)
Pos. Fbk.	11.0; 5.6 (5) (23.1 vid.)	7.5; 2.7 (6) (14.3 vid.)
Neg. Fbk.	10.3; 5.1 (5) (13.4 vid.)	9.8; 3.6 (6) (15.5 vid.)
Observer		
No Fbk.	15.7; 8.2 (5)	9.4; 5.0 (6)
Pos. Fbk.	6.9; 4.0 (4) (23.1 vid)	9.5; 4.9 (6) (14.3 vid.)
Neg. Fbk.	12.4; 4.6 (4) (13.4 vid.)	7.4; 3.1 (5) (15.5 vid.)

Note. Presented in this table are:
mean; standard deviation (n)
for each cell. Corresponding means from expt. 1 are presented below expt. 2 means in parentheses.

of errors in the negative feedback condition (1.61) than those who received positive feedback (0.84) and those who did not receive feedback (0.74).

There are few similarities between the pattern of data reported for the significant effects found in experiment 1 and the non-significant interactions reported here. It is even difficult to ascertain whether the video condition employed in experiment 1 is best compared with the mirror or observer condition employed in the present experiment as the means are generally so dissimilar. Evident from table 1 and 2 is the high general level of the standard deviations, indicating great variability in the data from this experiment. The low numbers of subjects per cell is also a cause for concern and is discussed below.

Correlation coefficients were computed between number of errors and and response latencies for trial one ($r=-0.15$, $n=98$, $p=0.077$) and trial two ($r=-0.21$, $n=98$, $p=0.021$). As in experiment one, these correlations are not large enough to justify application of any technique such as that used by Salkind and Wright (1977-discussed in chapter 6) to assess reflection-impulsivity and cognitive efficiency. As with the data from experiment one, a speed versus accuracy tradeoff is apparent in correlations for Type B (trial one: $r=-0.23$, $n=56$, $p=0.043$; trial two: $r=-0.33$, $n=56$, $p=0.00$) but not for Type A subjects (trial one: $r=0.05$, $n=42$, $p=0.46$; trial two: $r=-0.11$, $n=42$, $p=0.24$).

7.4 Discussion

The manipulations of social condition and false feedback had an effect on the performance of subjects in this experiment. In trial one subjects tended to make more correct responses in the social conditions (mirror and observer) than when they were alone. This may indicate that some type of accuracy standard becomes salient to all subjects in social conditions motivating them to perform more accurately. The social conditions may have just produced non-specific drive effects as has been found in other studies using self-awareness (eg. Duval and Wicklund, 1972; Wicklund, 1975) and social facilitation (eg. Cottrell, 1972) inducing manipulations. Whatever the cause of this improved accuracy, lack of any effects in the latencies data indicate that it was not produced at the expense of reduced speed of performance.

This main effect for social condition failed to emerge in trial two of the experiment. A number of factors may account for this. The introduction of the feedback manipulation may have interfered with the effect of social condition on subjects' performance, although this seems unlikely given the interactions between these two variables (and Type) in trial two of experiment one. Subjects may have habituated to the manipulations of social condition. This seems unlikely for two reasons. Firstly, no such habituation occurred in experiment one and it is hard to imagine that the close presence of an evaluative observer might have less impact on subjects than a video-camera. Secondly, the observer was audibly present during the task and it would seem very unlikely that subjects would habituate to an observer who provided continuous reminders of his or her presence. It is possible that subjects might have habituated to the mirror however, despite its close proximity, as it was situated to one side of subjects and may have been ignored by those concentrating closely on the task.

The process of completing attributions questionnaires after trial one of this experiment may be related to the lack of effect of the manipulation of social condition on subjects' performance on trial two of the present experiment. The process of answering attribution questionnaires may have forced subjects to introspect about factors affecting their performance. This process would, no doubt, require subjects to be aware of their performance standards as this is what the attribution questionnaires asked them about (data from attributions questionnaires are discussed briefly below with full details of these questionnaires and the data from them being provided in chapter 9). Thus, making attributions might tend to cancel out the differential effects which the social conditions may otherwise have had on subjects performance during trial two.

A brief experiment was run to test the hypothesis that the process of making attributions cancelled out the effects of a social manipulation (this experiment is reported in appendix E). In this experiment Type A and B subjects who only made attributions after the task were differentially affected by the alone versus observed manipulation (in terms of their post-task attributions). The post-task attributions made by Type A and B subjects who had made attributions during the task were not differentially affected by their social condition however. Thus, there is evidence that answering attributions questionnaires may cancel out the effects of manipulations of social condition.

The manipulation of false feedback had a significant effect on the number of errors which subjects made during trial two. Subjects who received negative feedback made more errors (on average) than those who received positive feedback or no feedback at all. There is no evidence from the latencies data that these errors were caused by subjects' attempts to work faster. This possibility cannot be ruled out, however, as subjects may already have been working as fast as they could and in trying to go faster still (after negative feedback), they may merely have made more errors. This effect gives the impression that subjects' performance was disrupted in some way by them receiving negative feedback. Later research has cast some light on the possible effects which this feedback manipulation may have had on subjects. Geen (1981) has proposed that negative feedback tends to produce drive effects. Such drive effects occurring in this experiment might have caused a greater number of errors to be made by subjects who received negative feedback (the roles of positive and negative feedback are discussed at much greater length in chapter 8.1).

The data reported in tables 1 and 2 do not offer much basis for comparison between the present experiment and experiment one. The data for mean number of errors made by subjects in the alone condition in both experiments are similar except for Type A subjects who received negative feedback making over twice as many errors (mean) in this experiment as in experiment one. The patterns of means for the latencies data are also similar for subjects who completed the task alone. Neither data type for subjects in the mirror or observer condition resemble the data from subjects in the video condition in experiment one. This would not be a cause for great concern, given that these were quite different manipulations, but the standard deviations from the experiment 2 data are rather high. This variability of data when combined with the low subject numbers in a number of cells of the design, make any interpretation of these patterns of (non-significant) data, a speculative exercise. A number of problems with this experiment which might have contributed to this variability in the data and to the failure to replicate the effects found in experiment one are discussed below. The problems discussed below also make the effects found for social condition (trial 1) and false feedback (trial 2) problematic to interpret.

7.5 Problems with Experiment Two

The lack of any significant main or interaction effects (in the performance data) involving Type (A/B) of subject in the present experiment was disappointing. This is possibly due to the selection criteria for subjects not being strict enough in this experiment. Undergraduate students who scored one half of a standard deviation (JAS A-scale) above the mean score of a group of their peers may not have very much in common with middle aged male subjects as used in many studies (see Matthews, 1982). The JAS itself has also been widely criticised (eg. Jenkins, 1978; Friedman, Thoresen and Gill, 1981) as it tends to misclassify a large proportion of respondents in comparison to the Structured Interview which is generally accepted as being the best available instrument for assessing Type A behaviour (eg. Friedman, Thoresen and Gill, 1981). This was an ambitious experiment and in order to get enough subjects from a relatively small subject pool it was necessary to relax selection criteria from those employed for experiment one.

Even with these relaxed criteria for subject selection it was not possible to get enough subjects. The minimum cell number of 4 subjects which occurred in three cells of the design lent insufficient power to the the statistical analyses which were employed. Therefore, given this insufficient number of subjects per cell, the chances of the analyses being able to identify weak or complex effects were greatly reduced. From the data presented in tables 1 and 2 no weak effects of any kind are apparent and, as already discussed, the data show little resemblance to those found in experiment 1. This lack of resemblance is particularly evident in the data from subjects in the mirror and observer conditions. There seem to be two possible explanations for this.

Firstly, the manipulations employed in this experiment may have failed to produce the same effects as the video manipulation employed in experiment one due to failure to induce self-awareness in subjects. This possibility is very unlikely, given the evidence (previously reviewed) to indicate that these manipulations would enhance self-focussed attention (see Carver and Scheier, 1981). Allied with this explanation is the possibility that these manipulations did something to subjects which the video manipulations had not. It is possible that the observer condition induced strong drive effects in subjects (perhaps through evaluation apprehension) which the previous video condition had not induced (the nature of, and problems associated with drive effects are discussed in the next chapter). This would explain the lack of similarity between these two conditions. It does not explain the problems with the mirror condition, however, which is where the second explanation may be useful.

It is possible that the manipulations of social condition, especially the mirror condition, which were employed in this experiment were too subtle to have an effect on subjects' performance. This is obviously unlikely in the case of the observer condition which is much more likely to have induced drive effects. It is also obvious that the mirror was not ignored by subjects during trial one as social condition had a significant effect on number of correct responses made by subjects during this trial. The mirror condition may well have come to be ignored by subjects on the second trial, however. They may have habituated to its presence or, as previously suggested, the process of making attributions may have cancelled out its effect on subjects during trial two.

The modification of the task may also have contributed to the failure of this experiment to clarify the effects found in experiment one. The omission of two of the most difficult anagrams in each trial of the task would obviously have reduced the level of difficulty of the task. From the data reported in tables 1 and 2 this was apparently the case. Although subject did not make consistently less errors on trial two of experiment two (than in experiment one), they do appear to have solved the anagrams more quickly (from the means displayed in table 2).

It seems unlikely that task difficulty would have been reduced to such an extent that it failed to challenge subjects sufficiently to elicit differences between Type A and B subjects. However, less strict criteria for the selection of Type A and B subjects were adopted in this experiment, and this combined with a less difficult task, may well have contributed to the lack of meaningful results. This might especially be so in the light of the omission of the non-uniquely soluble anagrams from experiment one. The fact that there were 3 non-uniquely soluble anagrams in the original task (two were omitted from the task for the second experiment) may actually have served to make it more frustrating and challenging. The interest that Type A subjects have in maintaining control has already been discussed at some length (eg. Glass, 1977b). It might have been experienced as particularly challenging by Type A subjects, to feel that they had correctly solved an anagram, only to be told that their solution was incorrect by a computer (with which argument and protest were impossible).

The removal of rarely solved anagrams from the original task may also have reduced its facility for eliciting performance differences between Type A and B subjects. With their interest in control and their apparent preference to respond to challenge with increased output (eg. Glass, 1977b; Burnham, Pennebaker and Glass, 1975), it is reasonable to expect that Type A subjects may have been particularly frustrated by the very difficult anagrams. These difficult anagrams may have disproportionately contributed to the effects found for errors data in experiment one. Type A subjects have been shown to find tasks which require a slow rate of responding very difficult and to respond to challenge with increased rates of responding wherever possible (eg. Glass, 1977b). Thus they would be sure to find the difficult anagrams extremely annoying as these would slow their rate of responding. These subjects would be much more likely to make both errors in typing, and in thinking that they had the correct solution but not waiting to check it mentally before typing it in.

As already suggested, the process of making attributions may have interfered with the effectiveness of the manipulation of social condition in trial two of this experiment. Subjects did not make attributions about factors affecting their performance after trial one in experiment one. Despite the fact that this process of making attributions may have interfered with the effect of the social manipulations on subjects' task preformance, the data from these attribution questionnaires do shed some light on the nature of standards held by Type A and B subjects. Significant 2-way interactions were found in this experiment for the effects of Type and social condition on the attributions made by subjects during this experiment. These effects tend to diffuse some of the criticisms of the procedure of subject selection and the manipulations of social condition employed in this experiment. These data are reported in chapter 9.

CHAPTER EIGHT

8.1 Introduction

For an understanding of the development of experiment three reported in this chapter, it is necessary to discuss developments in self-awareness and social facilitation research which occurred after the running of experiment two. These developments, to some extent, superceded the approach employed in experiment two. As will be discussed in some detail in this introduction, developments in these areas of research have helped to explain the failure of experiment two to yield interpretable performance data effects. They also prompted a return to the use of a video versus alone manipulation of social condition (as was employed in experiment one) in this third experiment.

As mentioned in chapter 7, Carver and Scheier (1981) greatly extended the notions of Carver (1979) concerning the nature of the mechanisms by which the presence of others (and manipulations designed to enhance self-awareness) induce behavioural changes. Carver's original proposal that self-focussed attention (a term preferred to the more general term self-awareness) elicits or engages in individuals a cybernetic type of self-regulatory process was extended. They refer to this process as "matching-to-standard". It involves the individual becoming aware of salient standards for behaviour in situations which promote self-focussed attention. Carver and Scheier believe that individuals attempt then to match their behaviour to the salient standard.

This theory is similar to the theory of Objective Self-awareness (eg. Duval and Wicklund, 1972; Wicklund, 1975; 1978; 1979) in that attention can be directed either towards the environment or towards the self. There is one major area, however, in which these theories diverge which is of importance to the present research. Previous to this work by Carver and Scheier, social facilitation theory and self-awareness theory were seen as being drive based (eg. Guerin and Innes, 1982; 1984).

Self-awareness was believed to affect behaviour by enhancing the drive level of individuals who became aware of the fact that their performance failed to meet the standard which they held for it (eg. Wicklund, 1975; 1978). This increased drive level was believed to be experienced as aversive. Social facilitation effects were explained satisfactorily by Zajonc (1965) also in terms of non-specific, drive effects induced by mere presence of another person. Cottrell (1972) persisted with this drive based approach but he specified that an evaluative audience was necessary to enhance drive levels.

Carver and Scheier (1981), however, proposed that enhanced drive was <u>not</u> the cause of the behavioural affects manifested by individuals in self-awareness or social facilitation inducing situations. They believed that in situations of this type which increase the amount of time in which individuals engage in self-focussing of attention, behaviour change is bought about by the engagement of self-regulatory feedback loop. This "matching-to-standard" procedure (essentially a development of the test-operate-test-exit system proposed by Carver, 1979) is not mediated by drive effects according to Carver and Scheier. They believe that it is a naturally occuring self-regulatory system for behavioural control which they liken to the various systems which promote physiological homeostasis.

Carver and Scheier conceptualize a behavioural standard as:

"point of comparison" (p. 120)

which the individual defines as desirable. They stress that these standards do not necessarily involve connotations of correctness or excellence although this may often be the case. Standards are seen as including various attitudes, desires and instructions (including those of a moral nature). These standards are seen by Carver and Scheier as being encoded in the memory and perhaps tied to other informational schemata which allow the categorization of situations. Thus they propose that schemata which enable individuals to recognise categories of events or situations will include information which will specify appropriate behaviours for those situations. This theorizing is supported by the work of Price (1974) who found that the perceived appropriateness of certain behaviours varies greatly across settings. Carver and Scheier believe that specific situations will evoke specific behavioural standards.

Although the process of engaging a "matching-to-standard" procedure may be one way in which social situations affect individuals' behaviour, other researchers have provided evidence that drive based effects also operate in many situations (eg. Guerin and Innes, 1982; 1984). The ways in which drive effects can occur in social situations are important to the present research, as such effects have the potential to interfere with the effects of manipulations of social conditions which attempt to elucidate the nature of performance standards derived from performance data. This was seen in chapter 6 where distraction effects were suspected as having affected the performance of Type B subjects after positive feedback, and in chapter 7 where a failure to find effects of an audience could have been due to different mediating processes being engaged.

8.1.1 Explanations of Social Facilitation Effects

There is evidence for at least 4 possible processes occuring in experiments which have found social facilitation effects. All of these processes are mediated by level of drive or arousal and thus fall outside of the Carver and Scheier (1981) formulation. These processes and the theories underlying them are not be discussed in full detail in this thesis but comprehensive review articles are cited (where available) for each approach. These approaches are not mutually exclusive, it being theoretically possible for all of them to occur in the same social situation. All processes are discussed in terms of their direct relevance to the present research.

Mere presence of another individual was believed, by Zajonc (1965), to produce elevated arousal or drive effects in humans and animals thus producing social facilitation of behaviour. Although widely criticised as failing to explain fully a large proportion of social facilitation research (see Guerin and Innes, 1982 for a review), this approach has generated a supporting literature (eg. Zajonc, 1980; Guerin and Innes, 1982). This mere presence theory does not appear to apply to the use of a video manipulation as a social condition, as no other individual is actually present (the nature of "implied audiences" is discussed later).

As discussed earlier (in chapter 7) evaluation apprehension has also been seen as constituting a source of drive in social facilitation research (eg. Cottrell et al, 1968; Cottrell, 1972). It is possible that evaluation apprehension operates additively with mere presence effects (eg. Zajonc, 1980) in a variety of social situations. It seems likely to have been a factor in experiments one and two. In experiment one subjects were told that their videotape would be studied by the experimenter who was interested in their behaviour during the task. This would seem very likely to engender evaluation apprehension in these subjects. An extremely evaluative observer was employed in experiment two.

It is not possible to predict, however, whether either of these manipulations would have any effect over and above the high levels of evaluation apprehension created by the computer run and scored task. It was also obvious to subjects that details of their actual performance were not available to the experimenter from the experiment one videotape (due to the positioning of the camera) or to the observer (due to his/her position relative to the subject) in experiment two. Subjects' demeanor, and perhaps their normal physical activity, may have been affected by these manipulations thus facilitating or inhibiting their performance (see Guerin, 1983).

Distraction was suspected as a possible cause of effects found in experiment one and as one of a number of potential problems associated with experiment two. Sanders and associates (eg. Sanders and Baron, 1975; Sanders, Baron and Moore, 1978; Baron, Moore and Sanders, 1978-see Sanders, 1981 for a comprehensive review) proposed that the presence of an audience motivates individuals to engage in social comparison. They believe that this social comparison represents a distraction from the task which then creates attentional conflict in the individual with concomitant increases in drive level. This theory, however, while superficially appearing to be relevant to an account of the present experiments in terms of distraction effects, may not infact be so. The video manipulation employed in experiment one did not provide subjects with a source of social comparison information and the audience in experiment two did not present any task-relevant comparative information to subjects.

This approach by Sanders and associates cannot be discounted, however, especially as there is ample evidence that distractors of a non-social kind may also create facilitation effects (eg. Houston, 1968; 1969; Houston and Jones, 1967). Distraction does have potential relevance as a factor affecting subjects' performance in the present research as a recent study at Adelaide has suggested that the presence of anyone in the room at the time of a subject performing can have drive-like effects in line with predictions from distraction-conflict theory (Falkner, 1983). The potential for auditory distraction associated with the use of video equipment was taken into account in the design of experiment three.

A fourth possible source of arousal or drive effects in social facilitation research has been proposed by Guerin and Innes (1982). They present evidence that people (and animals) are more alert in the presence of others than when alone; that individuals are more alert in the presence of strangers than they are in the presence of familiar individuals; and are also more alert in the presence of individuals whom they are unable to monitor. This theory attempts to explain both the human and animal social facilitation literature. Guerin and Innes believe that the presence of a conspecific poses a potential physical threat to individuals. This threat is greater from unfamiliar individuals (whose behaviour is therefore unpredictable) and when other individuals cannot readily be monitored. This theory does not appear to have any relevance to a video manipulation as no other individual is actually present in such a situation. The prospect of the experimenters later perusal of their videotape, also seems unlikely to be construed as physically threatening by subjects.

Individuals seem most likely to experience a video manipulation as a type of implied audience which Guerin and Innes (1984) believe will induce self-attention, social valuation and some evaluation apprehension effects. They believe that, added to these effects, a real audience will also induce alertness and arousal in subjects due to the threat of another individual's presence, in addition to possible mere presence, evaluation apprehension and perhaps distraction effects). It is the effect of self-attention and social valuation processes on Type A and B individuals which the present research aims to investigate in order to elucidate the nature of standards which become salient to individuals in these conditions.

Thus the use of a video condition seems ideal as a manipulation intended to enhance subjects' awareness of their own performance standards and to engage a "matching-to-standard" self-regulatory process. This is the process which Carver and Scheier (1981) believe mediates the effects of self-focussed attention on individuals' behaviour. Except perhaps for some evaluation apprehension, the use of a video manipulation is unlikely to produce strong drive effects to confound interpretation of effects which awareness of their own performance standards may have on subjects' performance.

The use of a video manipulation was also planned for experiment three because it would enable experiment three to be run as a partial replication of experiment one, which indicated that Type A and B subjects may possess differing performance standards.

The use of a social manipulation which avoids drive effects is rather pointless, however, if the feedback manipulation is suspected of producing such effects, either in isolation, or in combination with the social manipulation. It seems likely that negative feedback in particular, might produce drive effects by motivating subjects to try harder on trial two of the task. This possibility was entertained in chapter 6 and the possibility that feedback might have interfered with the effects of the social manipulations employed in experiment two (chapter 7) was also discussed. In experiment two subjects who had received negative feedback after trial one made about twice as many errors on average as those who received positive feedback or no feedback. Those who received positive or no feedback made about the same (mean) numbers of errors. Thus negative feedback may be a drive inducing manipulation in the present style of investigation. Evidence to support this notion has been reported.

Studies by Geen (1979; 1981) have indicated that quite different processes occur in observed subjects who receive positive feedback than in those who receive negative feedback about previous performance. Geen (1981) has suggested that subjects who receive positive feedback when observed experience positive affect and enhanced feelings of ability and competence. He believes that the presence of an observer provides these subjects with incentive to continue to do well at the task thus increasing their concentration and attention levels. Without an observer present Geen proposes that this effect is weakened by the reduced possibility of immediate approval.

Geen (1981) assessed subjects' persistence at a complex figure tracing task after they had received either positive or negative feedback about their performance on a bogus creativity task. His pattern of results was inconsistent with the predictions of drive theory. With support from previous research (eg. Blank et al, 1976; Dua, 1977), Geen proposes that observed subjects who receive positive feedback may be motivated to perform well in the interests of maintaining a favourable self-presentation. This is consistent with Dua's (1977) finding that the need to engage in impression management can have a greater influence on the performance of observed subjects than drive factors.

In the light of these data from the literature and the data from experiment one, positive feedback appears to have utility in enhancing subjects' awareness of their public standards for behaviour and performance. Obviously the standards which subjects hold would constitute the basis for their attempts at impression management (see Carver and Scheier, 1981) after positive feedback. The data from experiment one indicated that the combination of positive feedback and the alone versus video manipulation had greatly differing effects on the performance of Type A and B subjects. Thus the inclusion of a positive feedback manipulation in experiment three was believed to be necessary in order to make it a conceptual replication of experiment one and also to help enhance subjects' awareness of their performance standards.

Negative feedback about previous performance is proposed to have a completely different effect compared with positive feedback on observed subjects. Evidence from two studies (Geen, 1979; 1981) indicates that the effects of negative feedback on task performance are mediated by arousal or drive mechanisms, via the apprehension associated with knowledge of previous failure. There is other experimental evidence for the notion that drive effects are associated with negative feedback about previous performance. Seta and Hassan (1980) have reported higher levels of self-reported arousal in subjects who had failed on a previous task than in those who succeeded.

In order to avoid drive effects associated with negative feedback in experiment three, such a condition was not included. The data from experiment one indicated that negative feedback may not be particularly useful in elucidating the nature of performance standards. In experiment one Type A subjects appeared to inhibit self-awareness after negative feedback about previous performance. Therefore negative feedback is unlikely to yield useful information about their performance standards. The interpretation of any effects found for Type B subjects who receive negative feedback (Type B subjects were responsive to the alone versus video manipulation after negative feedback in experiment one) is likely to be rendered difficult by the strong possibility of drive effects having been produced (see footnote 1).

Footnote 1: After experiment two had been carried out but before the paper by Geen (1981) appeared, an experiment was designed to test the hypothesis that monetary incentive versus no incentive manipulation would have a similar effect (in combination with a manipulation of social condition) on the performance of Type A and B subjects as a positive versus negative feedback manipulation. This experiment (which is reported in greater detail in appendix F) failed to find any significant main or interaction effects for an incentive condition. This lack of effects may be due to shortcomings in the experimental design and task rather than being caused by a lack of utility of the incentive manipulation. There was, however, no evidence that the manipulation of incentive had any effect on subjects.

Thus the aim of this experiment is to elucidate the nature of the performance standards held by Type A and B subjects. It is evident that Type A subjects resist self-awareness after negative but not after positive feedback. The reasons for this pattern of responding can only be speculated about at this stage, although it seems likely that it is associated with the high standards which they possess for their performance. Knowledge about the general standards held by Type A individuals who receive positive feedback about previous performance, might also serve to explain why they resist being self-aware after negative feedback.

As has become obvious from the previous discussion, there has been a shift in emphasis or direction between experiment two and the planning for experiment three. This shift is mainly due to developments in the research literature on self-awareness, social facilitation and the effects of feedback manipulations. The chief aim of this investigation (and this thesis) was to elucidate the nature of the posited relationship between self-awareness and the dimension of Type A behaviour. From experiment one it was evident that Type A subjects tended to resist self-awareness but only when this state was likely to be aversive (after negative feedback) and not, as had previously been proposed, (eg. Matthews and Brunson, 1979) as a matter of course. Experiment one did more that enable a choice to be made between two hypotheses, however. It also indicated that Type A and B individuals possessed differing performance standards when relatively unself-aware (alone) and when their level of self-awareness has been enhanced (by a video manipulation).

In this experiment it was intended to approach the investigation of self-awareness and the Type A behaviour pattern by attempting to elucidate the nature of the behavioural standards of Type A and B individuals. A more detailed knowledge of such standards appears likely to accomplish the original aim of this investigation. Such an understanding may also cast light on the results of the questionnaire studies reported in chapters 4 and 5 which indicated a small but consistent positive association between dispositional self-awareness and the Type A behavioural dimension.

8.1.2 Introduction to Experiment Three

In the previous experiment the manipulations of social condition and false feedback had significant effects on subjects performance. Subjects tended to perform better in trial one, in terms of the number of correct responses which they made, in the social condition than when they were alone. This may indicate that some type of accuracy standard had become salient to all subjects in social conditions. However the lack of any effects in the latencies data would tend to indicate that this accuracy is not produced at the expense of reduced speed of performance. This main effect failed to emerge in trial two of the experiment. In the last chapter some of the factors which seemed most likely to be responsible for this were discussed. The most reasonable explanation seemed to be that the attribution questionnaires which subjects had completed after the first trial of the task served to enhance their self-awareness, thus interfering with the manipulation of social condition.

The process of answering attribution questionnaires also seemed likely to be the reason for the failure of experiment two to replicate the three way interaction effects found in experiment one for errors and correct latencies data (reported in chapter 6). Thus only a subset of subjects completed attribution questionnaires after trial one in this experiment. This procedure then became a manipulation of social condition rather than a source of data. All subjects still completed attribution questionnaires after they had finished the task and data from these questionnaires are reported in the next chapter (chapter 9).

The false feedback manipulation did have a significant effect on performance in trial two of the experiment two (in terms of the number of errors made by subjects with no significant effects for latencies data) but there were no significant effects involving subject Type (A or B). Experiment two also suffered from a lack of rigour in selection of subjects and a lack of statistical power in having very small subject numbers in a number of cells of the design. Thus main effects for the social conditions and false feedback manipulations may be expected as there were ample numbers of subjects per cell for these main effects analyses. The lack of 3-way interactions is not surprising given the very low number of subjects in some cells of the design. The experiment reported in this chapter was designed to overcome the problems associated with experiment two. It was also hoped it would cast some light on the nature of the performance standards held by Type A and Type B subjects while aware (video condition) and while relatively unself-aware (alone condition).

8.1.3 Selection of Subjects

Selection of subjects was improved by the use of the Videotaped Structured Interview. The VSI is widely accepted as being the most valid and reliable method available for assessing Type A behaviour, as discussed in chapter 2.5. Subjects were selected from those who took part in the questionnaire survey reported in chapter 5 (the version of the interview employed is outlined in chapter 5 and copies of the interview and scoring sheet are provided in Appendix B).

Subjects were also to be given an explicit performance standard for the second trial of this experiment, lest the positive feedback produce a tendency for them to relax (as was suspected in experiment 1). As discussed in chapter 6, it seemed likely from previous research (eg. Burnham, Pennebaker and Glass, 1975) that Type A subjects would already possess a standard which would stress the importance of speed rather than accuracy. Most of the previous research by Glass and associates (eg. Glass, 1977b) was carried out in experiments with an experimenter present. Carver and Scheier (1981) suggest that the presence of an audience engages a "matching-to-standard" procedure in individuals, inducing them to try to match their behaviour to public standards which they hold for it. Thus Type A subjects would appear to hold a public standard which promotes speed rather than accuracy of performance.

The previous research fails, however, to provide the basis for a firm hypothesis about the standard or standards for their performance which Type B subjects might hold. It was hoped that experiment three would, by not providing a performance standard in trial one and providing a very specific standard in trial two, provide much more information about the standards held by Type B subjects. As discussed in chapter 6, Type B subjects might be expected to consider speed to be of little importance, so the attempt to induce a public standard of speed might not even be a sufficient condition to prevent them easing off on the task after positive feedback.

8.1.4 Task

In order to ensure that the the task was demanding, the same task as employed in experiment one was used in the present experiment. The anagram task employed in experiment one appeared to be the best choice for the purely pragmatic reason that it served to differentiate between Type A and B subjects in combination with the social and feedback manipulations in experiment one and therefore had to be used in this attempted replication. The anagrams which were found not to be uniquely soluble were included. It seemed that the hard anagrams might be the ones which would best engage and challenge Type A and B subjects. Type A subjects perhaps are likely to find non-uniquely soluble anagrams particularly frustrating. The arithmetic task used in the two small experiments reported in appendix E and in appendix F did not appear to be a viable task for the present line of research.

8.1.5 Self-awareness Manipulation

It was hypothesised that subjects would respond to the video manipulation in much the same way as they had to the manipulation employed in experiment one. Unlike the video manipulation employed in experiment one, and the observer employed in experiment two, however, the manipulation to be used in the present experiment did not present a risk of an audible distraction to subjects. The video equipment in this experiment was situated behind a soundproof glass partition where subjects could easily see it but could not hear it operating. Thus this manipulation could not be expected to enhance subjects' level of drive during the experiment by distracting them, as was suspected. With the relative assurance that the effects of the video versus alone manipulation would involve a minimal drive based component, it was hoped that clearer interpretation of such effects could be achieved. Any interaction effects similar to those found in experiment one could be taken as being produced by the salience of their performance standards to subjects.

8.1.6 Attributions

The effect of the attributional process being used as a manipulation of social condition, however, was much more difficult to predict. It might be expected to make private standards salient by forcing subjects to introspect, but they would also realise the availability of their attributions to "public" (the experimenter's) scrutiny. Carver and Scheier (1981, p.301) suggest that such distinctions between public and private self-focus may often prove to be unimportant. They believe that private and public self-focus will lead to the same behavioural outcomes when they enhance the individual's awareness of some previously induced behavioural standard. There is evidence that this is not always the case for performance tasks however. Innes and Young (1975) found that a mirror and the presence of an audience had differing effects on the performance of subjects on a tracing task. This does not provide evidence completely contrary to the Carver and Scheier hypothesis, as the experimental situation may have induced drive effects due to mere presence, evaluation apprehension and distraction in the audience condition. The mirror condition employed by Innes and Young would be unlikely to have produced such drive effects, therefore drive effects may explain the difference between mirror and audience rather than the fact that subjects were attempting to match differing standards. This seems especially reasonable due to the admission by Carver and Scheier, that "mere presence" does not fall within the ambit of their theory (personal communication).

It was suggested earlier A and B Type subjects possess fairly specific (and greatly differing) behavioural standards. Thus the attribution questionnaires appear likely to make these standards salient to them whether they anticipate the later scrutiny of the experimenter or not. While it was not possible to hypothesize about the exact nature of the effects that this attribution manipulation might have on the performance of Type A and B subjects, it seemed likely that these effects might be similar to those produced by the video manipulation. There seemed a possibility, however, that the process of making attributions would produce drive effects through subjects' apprehension about the experimenter's later scrutiny of their attributions.

8.1.7 Manipulation of Feedback

Positive feedback was employed in experiment 3 in an attempt to replicate and clarify the nature of this effect found for positive feedback in the first experiment. It was also expected from the work of Geen (1981) that positive feedback would help make their behavioural standards salient to subjects.

8.1.8 Introduction of "Intermediate Typology" Subjects

This experiment also sought to clarify the effects found in experiment 1 by using a group of subjects who were neither Type A nor Type B but scored in the middle of the range (for the sample of undergraduate students) on both the Jenkins Activity Survey and the Videotaped Structured Interview. These were referred to as Type X subjects and were expected, as has been suggested elsewhere (eg. Chesney _et al_, 1981) to exhibit some Type A behavioural characteristics but not the full Type A pattern of behaviour. These subjects were included for two reasons. Firstly, it was hoped that they would provide another, more "normal" group, upon which the impact of the experimental manipulations could be assessed. Secondly, they might be used to assess the importance, as a component of the Type A behaviour pattern, of public performance standards (especially as regards the importance of speed of responding). If Type X subjects were found to respond to the social manipulation in a similar fashion to Type A subjects, these standards would appear to be quite a basic and pervasive aspect of the Type A behaviour pattern. If Type X subjects responded differently to Type A subjects, however, these standards would seem to be associated more with the extreme Type A pattern of behaviour (especially if the response of Type X subjects more closely resembled the response of Type B subjects).

It seems reasonable to hypothesize that the Type X subjects would not be affected by the social manipulation to the extent that it differentially affected the performance of their Type A and B counterparts during experiment one. As they only exhibit some Type A behaviours (eg. Dembroski et al, 1979), these subjects might also be expected to possess Type A performance standards to some lesser extent than Type A subjects.

8.2 Method

8.2.1 Subjects

From 173 scoreable protocols of the Jenkins Activity Scale For Health Prediction (computer scored version-Jenkins, 1979) completed by undergraduate students taking an introductory psychology course, students with scores greater than one standard deviation above or below the sample mean on the JAS A-scale were approached to take the Videotaped Structured Interview. Interviews were carried out by the first author who was trained in the presentation and scoring of the structured interview by Mrs. Nancy Fleischmann at the Harold Brunn Institute, San Francisco. Mrs. Fleischmann is chief interviewer for the Recurrent Coronary Prevention Project being run by Friedman and associates (see Friedman et al, 1982). The version of the interview learned by the author was substantially the same as the one discussed by Friedman, Thoresen and

Gill (1981) and copies of the interview questions and score sheets are provided in Appendix B (the interview as employed for selection of subjects for this experiment was discussed extensively in chapter 5).

It was not possible to have the interview videotapes checked by another trained interviewer, so any subject who the author had any doubts about classifying (all interviews were scored "live" and then the videotape rescored) were not approached to take part in the experiment (a reliability check on the author's interviews was later possible).

All potential interview subjects were contacted by telephone by the first author in the same manner as for experiments one and two. The interviewer was blind to the JAS score of each subject. Subjects who scored 60 or less points on the interview were classed as Type B and those who scored 200 or more points were classed as Type A. These are more extreme criterion than are employed by many other researchers in the field (eg. Friedman _et al_, 1981; Friedman _et al_, 1982) who would typically class any score over 135 as Type A and any score under about 90 as Type B (see note 8). Another group of introductory psychology students, approached at random, completed the JAS and were interviewed. Those who scored between 90 and 150 points on the interview and who did not have an extreme JAS A-Scale score (within one standard deviation of the sample mean) were classified as Type X. Potential Type X subjects took part in the experiment before being interviewed. Those who did not fall within the previously stated criteria had their data discarded from subsequent analysis.

Subjects were interviewed and debriefed by the first author, subsequently to be approached by another experimenter (actually a research assistant) to take part in an apparently unrelated experiment. At no time were subjects given any idea that they were not chosen at random to take part in the experiment. They did not know that there was any relationship between the experiment and the interview which they had earlier taken part in. This minor subterfuge was employed so that subjects did not associate the information about Type A behavioural characteristics which they were given in the interview debriefing with this experiment. It was feared that, if these subjects realized the connection between the interview and experiment, they would behave differently in light of the information they were given about their own Typology behaviour. These subjects were approached in the same manner as employed in the first two experiments.

8.2.2 <u>Experimental Task</u>

Exactly the same task was used as in experiment one.

8.2.3 <u>Apparatus</u>

All of the equipment used to run the task was the same as in experiment one. The same video equipment was also used but although it was in the same position relative to the subject, it was behind a soundproof glass partition (effectively in another room). Thus the camera was visible to Ss but the operation of the equipment could not produce an audible distraction.

8.2.4 <u>Experimental Manipulations</u>

1. <u>Social Condition</u>: Subjects completed the task in one of the following three conditions:

(a) completely alone,

(b) in front of operating video equipment (situated behind a glass partition), or

(c) alone but were asked to complete questions requiring them to make attributions about factors affecting their performance after trial one of the task (attribution questionnaires are included in Appendix F).

2. <u>False Feedback</u>: After trial one of the task all subjects received feedback that their performance on trial one had been "18% faster than average".

3. <u>Explicit Performance Standard</u>: The following message was presented automatically (by computer) to subjects after trial one of the task:

"TRIAL ONE WAS A PRACTICE TRIAL, PLEASE TRY TO GO FASTER ON TRIAL TWO".

8.2.5 Experimental Procedure

The same procedure was used as in experiment one except that subjects were presented with written and verbal task instructions. The same rationale for the experiment and videotaping were also used (a copy of the written instructions is provided in appendix F).

8.2.6 Experimental Design

The experiment presents a fully crossed 2 x 3 x 2 factorial design of subject sex by Type (A, X, or B) by Social Condition (alone or video) for trial one of the task. As some subjects completed attribution questionnaires after trial one, data from trial two present a 2 x 3 x 3 factorial design (with attribution included as a third social condition). The experimenter was blind to the Typology of all subjects and, although she was familiar with the concept of Type A behaviour, she was not cognizant with the hypotheses being tested or with the results of the previous experiments. Sixty-one subjects took part in the experiment (22 males and 39 females) and 3 cells of the design had the minimum cell number of 6 subjects. The author randomly assigned all except the last few subjects (who were assigned non-randomly, in order to equalize the cell numbers) in the experimental conditions.

8.2.7 Dependent Measures

The same performance measures as collected in the last two experiments were collected during this experiment. Attributions data were also collected from all subjects after they had completed the task (analysis and discussion of these data are in chapter 9).

8.3 Results

All performance data from the task were analysed in a series of two-way analyses of variance, using the Statistical Package for the Social Sciences "Anova" procedure (Nie, et al, 1970). The independent variable sex failed to approach an acceptable level of significance as a main or interaction effect for any of the indices of performance from trial one or trial two of the task. Sex of subject was therefore excluded from all subsequent data analyses.

A series of two-way analyses of variance were carried out on latencies for correct responses, number of correct responses and number of errors from trials one and two of the task. The independent variables Type (A, B or X) and the Social Condition (alone or video) failed to gain an acceptable level of significance as main effects on the performance data in trial one of the task (see appendix G.2). None of the independent variables (including the attribution condition) gained significance as main effects in trial two of the task (see appendix G.3). A significant interaction effect (see table 3 for means, standard deviations and cell n.s and figure 1 for a graph of this effect) was found for the independent variables, on number of errors made by subjects during trial one of the task ($F=3.77$, $df=2, 42$, $p=0.032$). The data from subjects who were to complete

Table 1: Means, standard deviations and subject numbers for 2-way interaction of number of errors made during trial one by Type and Social Condition.

	Social Condition	
	Alone	Video
Type A	$\bar{X}=2.00$ SD=1.77 n=8	$\bar{X}=0.63$ SD=0.74 n=8
Type B	$\bar{X}=1.00$ SD=1.10 n=6	$\bar{X}=2.00$ SD=1.10 n=6
Type X	$\bar{X}=0.75$ SD=1.17 n=8	$\bar{X}=1.14$ SD=1.10 n=7

attribution questionnaires was not included in these analyses of trial one data as it was not possible to control whether these subjects looked at the questionnaires during trial one (as the questionnaires were

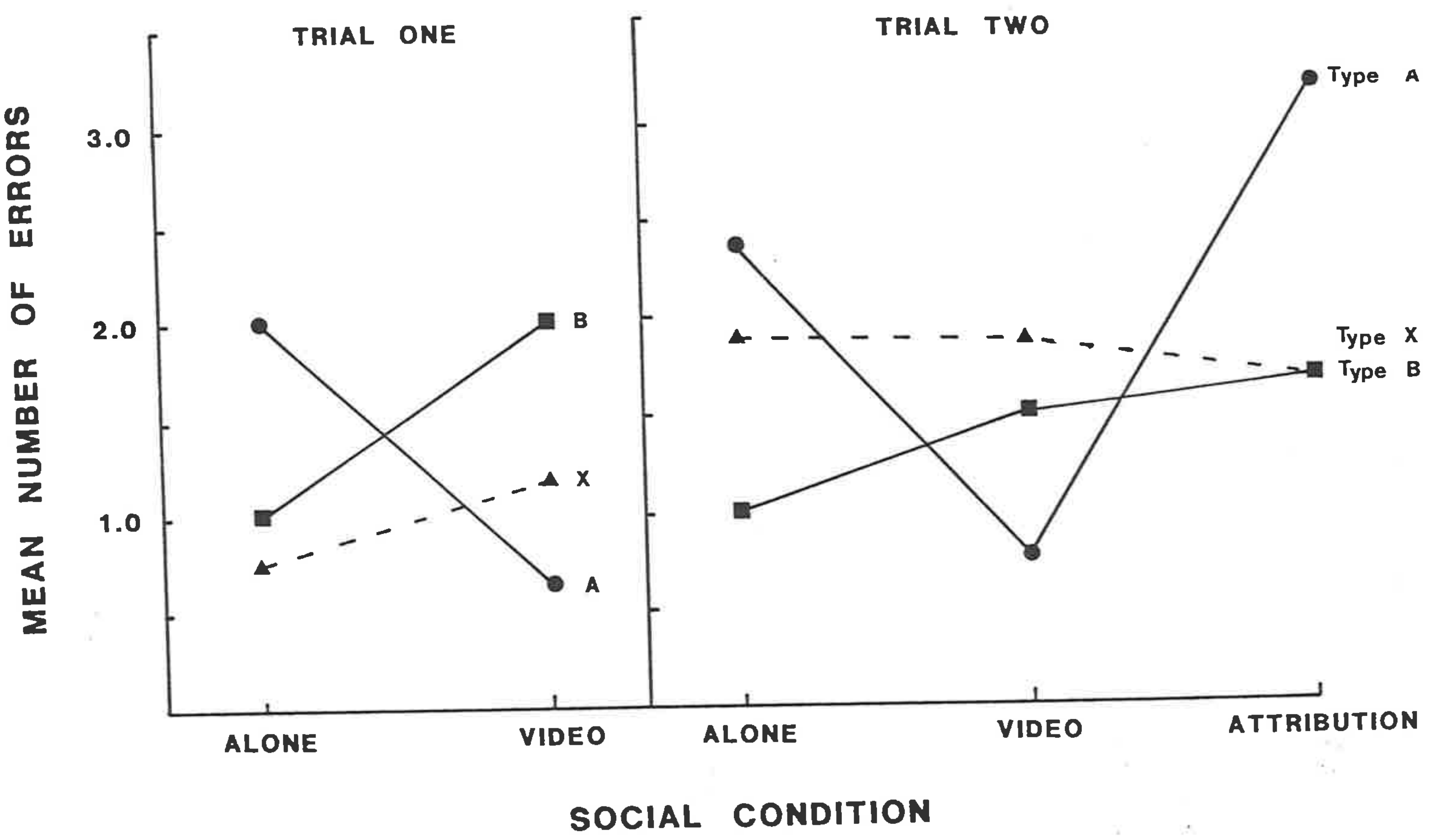


Figure 1: Mean number of errors made by subjects during both trials of experiment three by Type and Social Condition

lying next to the computer terminal on the desk). Thus it was not possible to include these subjects' performance data in the alone or the attribution condition. Knowing that they would have to complete attribution questionnaires may also have had a different effect on subjects' subsequent performance than actually completing them (as was required after trial one).

The independent variables (Type and Social Condition) combined to produce significant interaction effects on both number of errors ($F=2.55$, $df=4, 60$, $p=0.050$; see figure 1) and on number of correct responses ($F=3.47$, $df=4, 60$, $p=0.014$-see figure 2) made during trial two of the task (means, standard deviations and cell n.s for these interactions are presented in tables 2 and 3). The same interaction almost reached an acceptable level of significance for latencies for correct responses in trial two ($F=2.20$, $df=4, 60$, $p=0.082$). As in experiment one, these latencies data were natural logarithm transformed to reduce their variability but this procedure failed to produce an acceptable significance level upon reanalysis ($F=2.00$, $df=4, 60$, $p=0.108$). All analyses of trial two performance data are presented in appendix G.3. The interaction effects for number of errors made in trial one and two are graphed in figure one and the interaction effect for number of correct responses made in trial two is graphed in figure two.

Type X subjects made significantly more errors during trial two (Mean=1.81) than they made during trial one (Mean=1.10)(T=2.31, df=20, p=0.032). There was no significant difference between Type A, B and X subjects on how many anagrams they failed to attempt to solve (within the 60 second time limit) on either trial of the task.

Table 2: Means, standard deviations and subject numbers for 2-way interaction of number of correct responses made during trial two by Type and Social Condition.

	Social Condition		
	Alone	Video	Attribution
Type A	$\bar{X}$=6.37 SD=2.00 n=8	$\bar{X}$=8.50 SD=1.60 n=8	$\bar{X}$=6.50 SD=1.76 n=6
Type B	$\bar{X}$=7.50 SD=1.38 n=6	$\bar{X}$=7.00 SD=1.55 n=6	$\bar{X}$=9.00 SD=0.63 n=6
Type X	$\bar{X}$=7.88 SD=1.36 n=8	$\bar{X}$=7.29 SD=1.98 n=7	$\bar{X}$=8.50 SD=1.05 n=6

Figure 2: Mean number of correct responses made by subjects on trial two of experiment three by Type and Social Condition

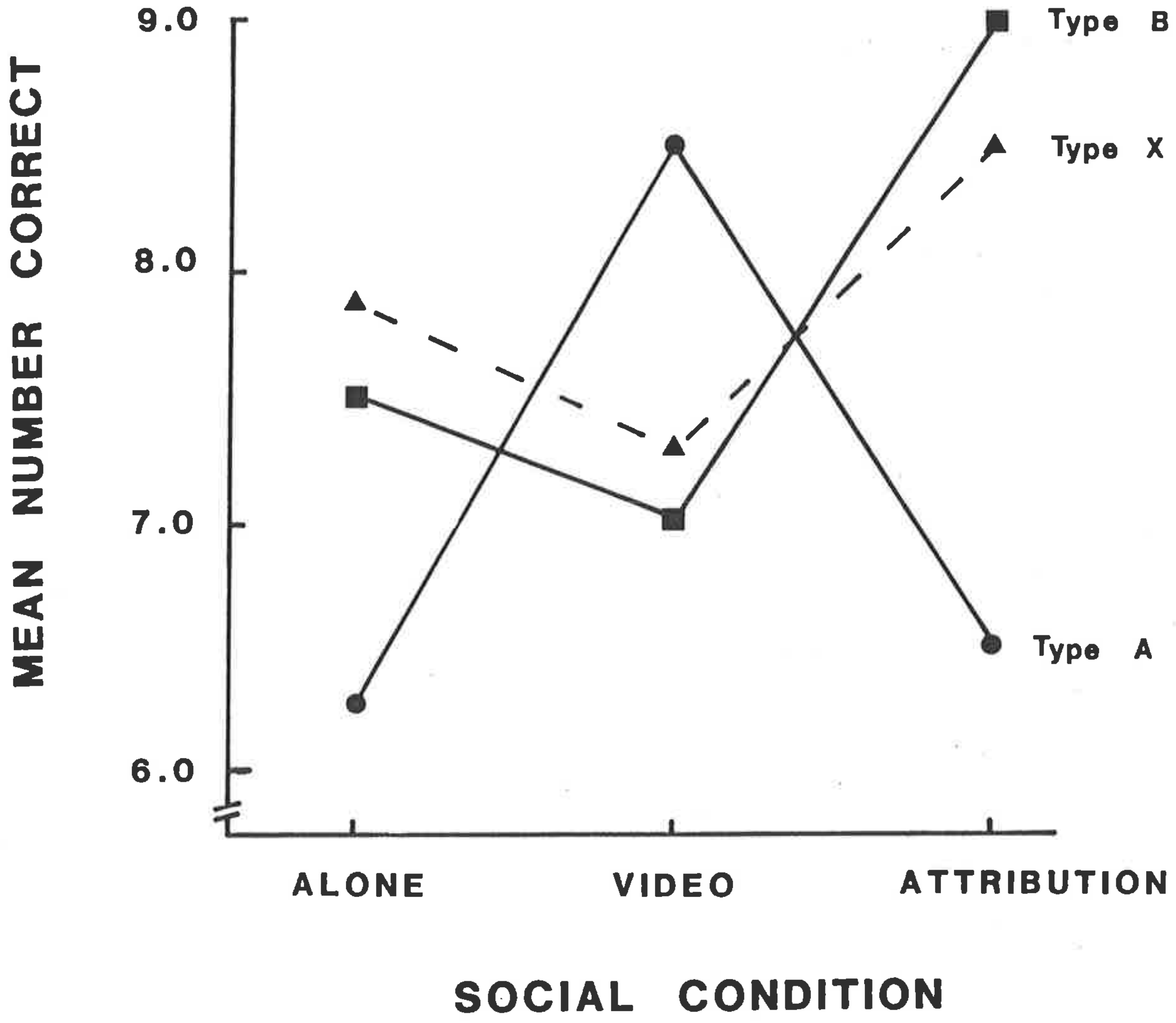


Table 3: Means, standard deviations and subject numbers for 2-way interaction of number of errors made during trial two by Type and Social Condition.

	Social	Condition	
	Alone	Video	Attribution
Type A	$\bar{X}$=2.38 (1.83) SD=1.30 n=8	$\bar{X}$=0.75 (0.83) SD=0.89 n=8	$\bar{X}$=3.17 SD=0.98 n=6
Type B	$\bar{X}$=1.00 (0.50) SD=0.63 n=6	$\bar{X}$=1.50 (2.11) SD=1.64 n=6	$\bar{X}$=1.67 SD=1.21 n=6
Type X	$\bar{X}$=1.88 SD=0.99 n=8	$\bar{X}$=1.86 SD=2.04 n=7	$\bar{X}$=1.67 SD=1.03 n=6

Corresponding means from experiment 1 are presented below experiment 3 means in parentheses.

From table 3 it is evident that there is not a great similarity between the patterns of errors data for this experiment and the relevant means from the significant effect reported in experiment one. If the graphs of the interactions are compared, however, (figure 1 in this chapter and in chapter 6) there does appear to be a basic similarity between these effects. It is possible that the differences between the two effects are due to the imposition of the specific performance standard in the present experiment. Other factors, in particular, more rigourous subject selection, must also be suspected of playing a part in producing the difference however.

No significant effect was found for latencies data in this experiment (raw or natural log. transformed). It seemed likely that similarities might exist between the nonsignificant effect in this experiment and the significant effect which was found (for transformed data) in experiment one however. These data are reported in table 4. As can be seen from this table (which also reports relevant mean latencies from experiment one), there is little similarity between the patterns of means from these two effects.

Preliminary analyses to determine the suitability of data from this experiment to be combined to produce an index of efficiency (as was investigated in chapter 6.4) were carried out. As with the data from experiment one, latencies and errors data from this experiment were moderately correlated for Type B subjects ($r=-0.52$, $n=18$, $p=0.014$) but were negligably correlated for Type A subjects ($r=0.10$, $n=22$, $p=0.34$). As might be expected, data from the Type X subjects yielded a similar negligable correlation to the Type A subjects ($r=-0.12$, $n=21$, $p=0.31$). Thus the overall correlation for the subject sample was not of sufficient ($r=-0.17$, $n=61$, $p=0.093$) magnitude to allow application of a procedure designed to compute an efficiency score for subjects.

Table 4: Means, standard deviations and subject numbers for non-significant 2-way interaction of latencies for correct responses on trial two by Type and Social Condition.

	Social Condition		
	Alone	Video	Attribution
Type A	$\bar{X}=11.23$ (9.95) SD=6.96 n=8	$\bar{X}=12.28$ (23.10) SD=6.96 n=8	$\bar{X}=13.46$ SD=8.52 n=6
Type B	$\bar{X}=11.48$ (14.10) SD=6.60 n=6	$\bar{X}=10.45$ (14.31) SD=6.39 n=6	$\bar{X}=9.01$ SD=2.06 n=6
Type X	$\bar{X}=10.75$ SD=5.04 n=8	$\bar{X}=11.89$ SD=3.56 n=7	$\bar{X}=14.59$ SD=4.54 n=6

Corresponding means from experiment 1 are presented below experiment 3 means in parentheses.

8.4 Discussion

8.4.1 Errors Data

Initial discussion of the effects found for number of errors made by subjects in both trials of this experiment will ignore the data for Type X subjects and for all subjects in the attribution condition in trial two of the task. This is due to the fact that these subjects and conditions were not used in experiment one which the present experiment sought to replicate. Comparison of Type A and B subjects with Type X subjects will be considered later in this chapter. The effect which the alone versus video manipulation had on number of errors made by Type A and B subjects in both trials of this experiment is very similar to the effect which this manipulation had on these subjects after positive feedback during experiment one.

Type A subjects show almost exactly the same pattern of errors data in response to the social manipulation in trials one and two of this experiment as they showed in trial two of experiment 1 (see figure 1 in chapter 6). Earlier speculation (in chapter 6) about the nature of performance standards held by Type A individuals when relatively unself-aware (alone) and when their public performance standards are salient to them (video), are supported by these data. When alone, Type A subjects make a relatively high number of errors. This is predicted by Burnham _et al_ (1975) who suggest that Type A individuals normally are more concerned about the speed than about the accuracy of their performance. In the video condition Type A subjects consistently make less errors (less than half as many, on average). This offers evidence that the social nature of the video condition has made some accuracy standard salient to Type A subjects. The significant interaction effect for latencies data found in experiment one, however, was not replicated in this experiment.

The fact that the introduction of a specific instruction to go as fast as possible did not change the pattern of errors data of Type A subjects, may indicate that they were already working as fast as they were able. The lack of effects for the latencies data also tends to support this contention, although these data provide no direct proof of this. From table 4 it is evident that Type A and B subjects were affected differently by the imposition of this standard. The mean latency for videotaped Type A subjects in experiment one should perhaps be discounted (as discussed in chapter 6.3) due to the very high variability in data from these subjects. Type A subjects in the alone condition responded more slowly in this experiment than their counterparts in experiment one. They appear not to have been responsive to the imposition of the specific standard. Type B subjects in both conditions do appear to be responsive to this standard as they show shorter average latencies that their counterparts in experiment one.

The attribution condition did not, as was hypothesized, have an effect on Type A subjects similar to the video manipulation (although this was the case for Type B and X subjects). Type A subjects who completed attribution questionnaires made a dramatically greater number of errors than subjects who were videotaped (over 3 times as many, on average) and made more errors than subjects in any other condition. This effect seems unlikely to be soley due to the attribution condition making some performance standard salient to these subjects. It may be due to the attribution condition introducing drive effects, however, even though it did not have a marked effect on the number of errors made by Type B and X subjects. The Type A subjects may have felt that they had made some public commitment to excellent performance in these attribution questionnaires which they were then highly motivated to try to live up to. The reaction of Type A subjects to an item concerning the importance of luck to their performance, is particularly relevant to this possibility of drive effects. This effect and its contribution to an understanding of the general nature of the performance standards held by Type A individuals is discussed in the next two chapters.

The effect which the alone versus video manipulation had on the number of errors made by Type B subjects on trial one of this experiment was very similar to the effect which it had on the number of errors made by Type B subjects during trial two of experiment one. These Type B subjects made relatively few errors when alone, although those in experiment one made fewer (on average). Type B subjects made more errors when videotaped but not as many (on average) as made by videotaped Type B subjects in experiment one. Thus, while the pattern of the effect found in experiment one was replicated, the effect found in this experiment was not as extreme.

In experiment one this pattern of error data was explained with reference to the positive feedback which subjects had received. It was suggested that the Type B subjects who were alone were relatively unaware of the feedback concerning their previous fast performance. Type B subjects in the video condition, however, were expected to be more cognizant of this positive feedback. Therefore it was suggested that that they tended to relax on the task and to make more errors. As a similar pattern of error data was found in trial one of this experiment, when Type B subjects had not received positive feedback, this explanation obviously fails to stand up.

Another explanation of the data found in experiment one was that Type B subjects concentrated on accuracy when alone but were distracted by the noise of the equipment in the video condition and, as a consequence of this distraction, made more errors. The use of a non-distracting video condition in this experiment does not completely negate this argument. The effect found in trial one of the present experiment is not as extreme as the effect found in experiment one, thus the experiment one effect might be suspected of having been augmented to some small degree by drive effects associated with distraction from the task. It would appear that this effect may be clarified somewhat by the fact that it was much less extreme (almost non-existent) in trial two of the present experiment.

Type B subjects who are alone make very nearly the same (mean) number of errors in both trials of the task. Thus the positive feedback and specific performance standard provided before trial two appear to have had no effect on these subjects. Whereas videotaped Type B subjects in the first trial make about twice the (mean) number of errors that their alone counterparts made, the videotaped Type B subjects in the second trial do not even make one and a half times as many errors as their counterparts who were alone. It is unlikely that this pattern of data is produced by some performance standard becoming salient to the Type B subjects when videotaped in the second trial. It also does not appear that they are adopting the standard provided in the experiment. If they were trying to go as fast as possible on the task (as they were asked to do), videotaped Type B subjects would be expected to make more errors than in trial one rather than less (as is the case).

A more reasonable explanation for these data may be that the video condition makes some standard salient to Type B subjects which tends to conflict with their careful performance on the task. For some reason, perhaps due to habituation or the effects of the positive feedback or the specific performance standard, this standard has less effect on subjects' performance during trial two. It is difficult to imagine what type of standard might have this effect (which is discussed further in the next chapter) on Type B subjects and it is therefore tempting to look for another explanation.

This experiment was designed to elicit minimal drive effects, but the possibility that the video manipulation would create drive effects through evaluation apprehension was entertained. In trial one of the task the video condition may have served to create evaluation apprehension in the Type B subjects, thus causing them to make more errors than Type B subjects who were alone. Habituation to the video manipulation may be responsible for Type B subjects making less errors in trial two. It does not seem possible that the positive feedback was responsible for this pattern of data as Type B subjects made a great number of errors after positive feedback in the video condition of experiment one. It may be that these subjects were affected by the imposition of a specific performance standard during the present experiment but it is difficult to see how salience of a standard which required these subjects to perform as quickly as possible, could induce them to make less errors. Thus these data are not easily explained but are discussed further, with reference to subjects' attributions, in the next chapter.

8.4.2 Type X Subjects

The pattern of errors data produced by Type X subjects is much more similar to that produced by Type B than by Type A subjects. Type X subjects are very little affected by the alone versus video manipulation in either trial of the task. They do however, make more errors in trial two. Thus they appear to have attempted to comply with the specific request to respond as quickly as possible on trial two. Type A subjects do not appear to be affected by the imposition of this standard and Type B subjects are not greatly affected by it. Type B and X subjects however, show very little response to the manipulation of social condition. Thus it appears that Type A subjects may hold particularly strong performance standards but that Type B and X subjects may not hold such strong standards. This proposition is discussed in the light of subjects' attributions, in the next chapter.

As was hypothesized, the attribution condition had a similar effect on the performance of Type B and X subjects as the video condition. This is in contrast to the markedly differing effect which these two conditions had on the number of errors made by Type A subjects. Thus a videotaping procedure and the process of making attributions appear to make similar standards salient to Type B and X subjects and greatly differing standards salient to Type A subjects. The nature of these standards is discussed further in this and in the next chapter. It is worthwhile to note that, especially on trial two of the task, the performance of Type A subjects is much more strongly affected by the manipulation of social condition than the performance of Type B and X subjects.

8.4.3 <u>Number of Correct Responses Data</u>

The significant interaction between subject Type and the alone versus video manipulation was found for log transformed correct response latencies in experiment one was not replicated in this experiment. A significant interaction for number correct on trial two of the task was however, found in this experiment. This effect (figure 2) is similar to the effect found for errors data in two important ways. Firstly, Type B and X subjects respond to the social condition in a very similar fashion. This similarity is even more pronounced than the similarity in errors data. Secondly, Type A subjects again appear to be more responsive to the social conditions than the Type B and X subjects, although this is not as pronounced as for errors data.

As with the data for number of errors, the number of correct responses made by Type B and X subjects is little affected by the alone versus video manipulation. Both Type B and X subjects make slightly less correct responses in the video than in the alone condition, whereas Type A subjects make a much greater number of correct responses when videotaped than when alone. This adds weight to the earlier argument that Type A subjects possess stronger or more pervasive standards for their performance in social situations than Type B and X subjects.

Number of correct responses data for Type B and X subjects are responsive to the attribution condition, unlike the errors data from these subjects. These subjects make more correct responses after completing attributions questionnaires than the Type B and X subjects who were alone or videotaped. This is the opposite pattern of data to that exhibited by Type A subjects who, after completing attributions, got many less correct, than Type A subjects in the video condition (Type A subjects in the alone condition also got many less anagrams correct). Whereas the attributions condition appears to make Type B and X subjects concentrate more on getting anagrams correct (although it has a negligible effect on their error rates), this manipulation appears to interfere with the performance of Type A subjects. This also seemed to be the case for Type A subjects' errors data and is discussed in the next chapter in the light of the Type A subjects' attributions data.

8.4.4 General Discussion

Looking at the effects for errors and number of correct responses data it is apparent that Type A subjects perform best in the video condition. In this condition they make very few errors and get a much greater number (on average) correct than their Type A counterparts in the alone and attributions conditions. This fits in well with the hypothesis (from chapter 6) that some accuracy standards become salient to Type A subjects when the video focusses their attention on public aspects of themselves. In the alone condition these subjects make a relatively great number of errors and get fewer anagrams correct. This supports the previous speculation by Burnham et al (1975) that Type A subjects usually appear to be rather less interested in accuracy than in fast performance. Earlier it was hypothesized that this orientation may be produced by a public performance standard for Type A individuals. From the present data, however, it appears that it may be the approach they tend to adopt when unself-aware. The video manipulation may induce Type A subjects to see this normal mode of responding as inappropriate. Such an effect of the video manipulation appears to be even more powerful in the light of its continued existence in trial two of the present experiment, when the importance of rapid responding (with no mention of accuracy) had been stressed to subjects (by the imposition of a specific performance standard).

As might be expected, the number correct and errors patterns of data seem to reflect each other for Type A subjects but curiously, not for Type B and X subjects. It seems reasonable to expect that subjects who make more errors, will get less anagrams correct, even though they will simply be unable to solve some anagrams. There does not appear to be (from figures 1 and 2) any relationship between these variables for Type B and X subjects, especially in response to the attribution condition. Type B and X subjects made more correct responses (on average) in the attribution condition, than their counterparts in the video and alone conditions. However, they made almost exactly the same (mean) number of errors as Type B and X subjects in the other two conditions. This tends to indicate that some useful information about all subjects' style of dealing with the task might be found in the data on anagrams not attempted. Analyses indicated that subject Type (A, B or X) had no significant effect on how many anagrams they failed to attempt on either trial of the task, however.

Thus it appears from this experiment that Type A subjects do possess an accuracy standard which becomes salient to them in public situations. Type B and X subjects do not appear to possess such strong performance standards in social situations. The pattern of data from Type X subjects was very similar to that produced by Type B subjects (in both errors and number correct data). It would seem that the performance standards held by Type A individuals are a part of more extreme manifestations of that pattern of behaviour. This proposition, and the nature of performance standards held by A and B Type individuals, will be discussed in relation to subjects' attributions in the next chapter.

CHAPTER NINE

9.1 Introduction

This chapter reports data from subjects' attributions about factors affecting, and related to, their performance during experiment two (chapter 7) and experiment three (chapter 8). Subjects' attributions were investigated in an attempt to add to the information about their performance standards provided by the data already reported. Experiment one (chapter 6) provided evidence that the social situation made salient differing standards for their performance to Type A and B subjects. Thus attributions data were collected in experiments two and three as a possible method of further elucidating the nature of these performance standards. Due to the doubts expressed previously (chapter 7) about the methodology, selection of subjects and low subject numbers in experiment two, the attributions data from this experiment will be treated with caution.

Attribution questions were mainly drawn from items developed by Feather and Simon (1971) to assess beliefs about the 4 factors which experimental subjects seem likely to see as being relevant to their performance (eg. Weiner, Frieze, Kukla, et al, 1971). Two of these items concerned "luck" and "task difficulty", which subjects were likely to perceive as not being under their own control. Subjects seemed likely to see "effort" as being under their own control. This dimension of control is particularly relevant to Type A individuals who prefer to maintain a sense of control of their environment at all times. Thus it was hypothesized that Type A individuals would prefer to see factors over which they had control as affecting their performance most strongly, although this might be determined, to some extent, by their actual level of performance. It was expected that Type A subjects would be reluctant to rate uncontrollable factors as having greatly influenced their performance, as these would hardly reflect mastery and control. It was not possible to make any predictions about the response of Type B subjects to these attributions items, however, as little is known about their response to situations such as this.

It was appropriate to employ these attribution items in experiments two and three in the light of the literature on attribution theory in existence at the time that these experiments were run. Weiner (1983) has subsequently dealt with the appropriateness of such items in a variety of experimental designs and situations. He discusses a number of pitfalls which are possible in attributional research. Some such pitfalls occur in experiments which use feedback (such as the present) where this feedback may be inconsistent with the task, inconsistent with the subject's experience during the experiment, or inconsistent with the subject's general life experience and expectations. None of these problems are apparent in experiments two or three as feedback about average speed of anagram solutions, in comparison to another group of student subjects, would appear to be entirely appropriate.

Although Weiner (1983) discusses a number of pitfalls which do not apply to these experiments, a problem which is of great potential concern is that in some experimental situations data from these 4 attribution items can be mis-interpreted. Generally ability is seen as an internal, stable cause of behaviour; effort is internal, unstable; task difficulty is external, stable; and luck is most often seen as external and unstable. Weiner (1983) proposes that these generally accepted categorizations are not appropriate in some situations. He poses a number of scenarios in which these categories might not hold. It is not appropriate to deal with such situations in detail here, however, as Weiner specifically mentions the task of anagram "unscrambling" as one in which the original categorizations of the four items appear to be appropriate. Kukla (1972) has also maintained (in greater detail) the appropriateness of anagram solution tasks for attribution research.

Besides the 4 items adopted from Feather and Simon (1971-see appendix J.1 for copies of the attribution questionnaires employed in experiment two) another question was added to attribution questionnaires. In questionnaires which subjects completed after trial one of both experiments they were asked to rate how hard they intended to try on trial two of the task. With their interest in control, Type A subjects were expected to indicate an intention to try much harder, as this appears to be their normal response to situations in which their control is threatened (eg. Burnham, Pennebaker and Glass, 1975; Glass, 1977a; 1977b). Again it was not possible to predict the response of Type B subjects, although they might be expected to show a less extreme response, given that they generally appear to set more realistic standards (eg. Snow, 1978; Grimm and Yarnold, 1984) for their own performance than Type A subjects and are less interested in control (eg. Glass, 1977b).

Their interest in control, and their high standards for performance, were also expected to affect Type A subjects' rating of how happy they were with their performance in trial two of experiment two and on the whole task in experiment three. This item was included in the attribution questionnaire which subjects completed at the end of the task. It was expected that, with their more reasonable expectations, Type B subjects would generally be more happy with their performance than Type A subjects.

Naturally the responses of all subjects were expected to be affected by the social situation in which they completed attribution questionnaires. As there had been an interaction between the independent variables in the performance data from experiment three, a similar interaction was expected in attributions data from that experiment. If their beliefs about factors influencing their performance were affected by their social situation, these data might be expected to provide direct information about the differing performance standards of

Type A and B individuals. If attributions made by Type A and B subjects were related to their performance on the task, these data might also provide information about the degree to which Type A individuals manifest that pattern of behaviour in response to their social situation and the standards which it makes salient to them.

9.2 Method

The data reported here were collected during experiment two which is reported in chapter 7. Therefore, only information on methodology concerning attributions questionnaires is reported here. These questionnaires were answered by subjects after each of the two performance trials of experiment two. Subjects were only provided with false feedback about their performance on trial one after they initiated trial two of the task. Thus they did not receive feedback before answering the first attribution questionnaire. Subjects were briefed on this procedure before starting on the performance task. Thus the experimenter did not need to be present to prompt subjects. However, a few subjects did forget to complete questionnaires between trials. The data from these subjects were not included in the analyses and therefore subject numbers vary slightly for some analyses.

9.2.1 Attributions Questions

Subjects completed attribution questionnaires after each trial of the task. They were asked to rate the importance, as factors affecting their performance, of ease (or difficulty) of the task, amount of effort, luck, and amount of ability. These factors were rated on a 9-point scale where a rating of 1 indicated "not a cause", 5 indicated "somewhat a cause" and 9 indicated that the factor had been "very much a cause" of their performance level (adapted from Feather and Simon, 1971- see appendix J.1 and J.2 For copies of these questionnaires).

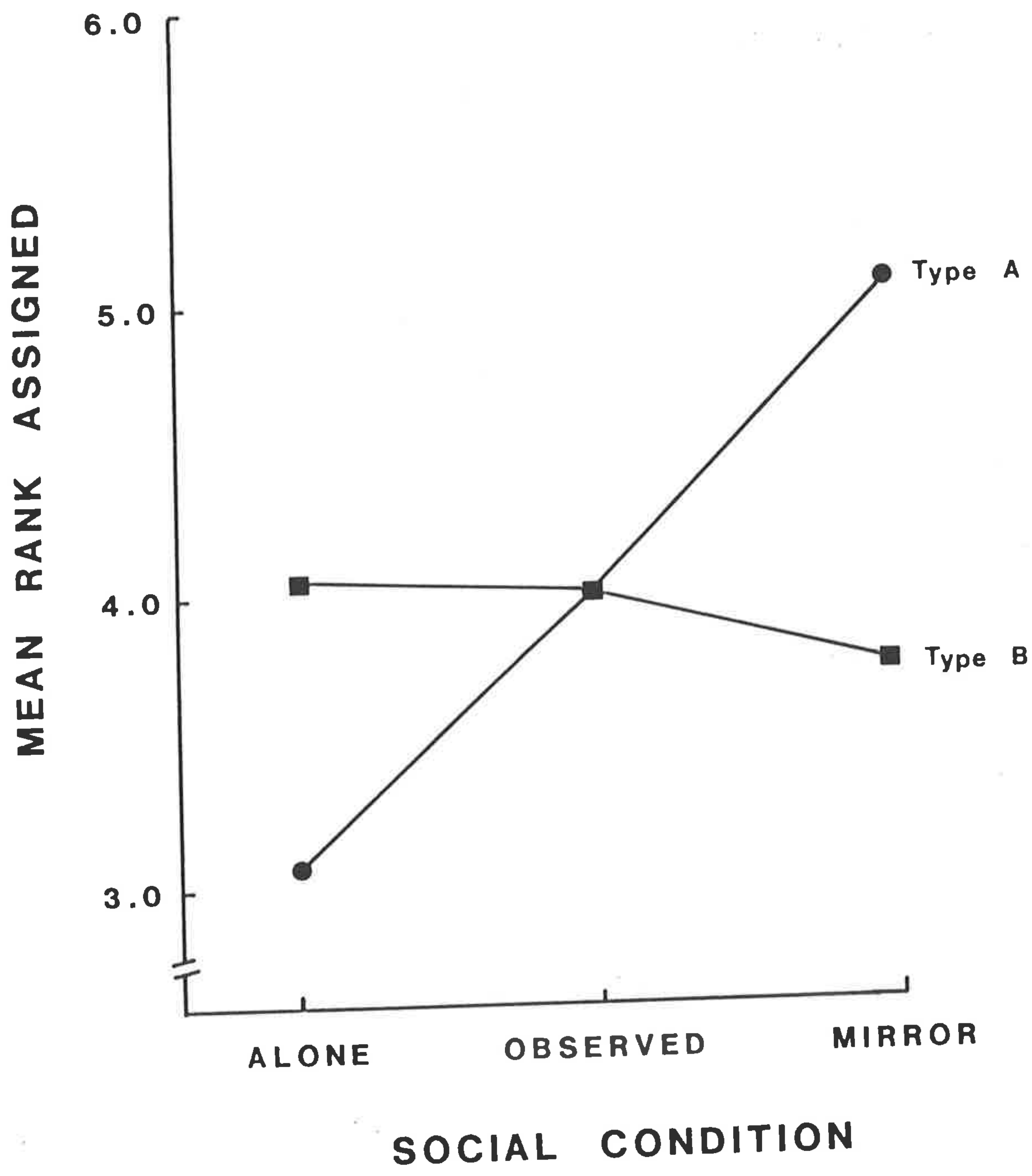
After they had completed trial one subjects were also asked to state how hard they intended to try as the task continued. On a 9-point scale a rating of 1 indicated their intention to "try much harder", 5 indicated "put in about the same effort" and a rating of 9 indicated that the subjects intended to "stop trying so hard" (appendix J.1). After they had completed trial two subjects were asked to rate on a 9-point scale, how happy they were with their performance on trial two of the task. A rating of 1 indicated "very happy" and a rating of 9 indicated that they were "very unhappy" with their performance (appendix J.2).

9.3 Results

All matching trial one and two attributions questions were significantly intercorrelated (at the $p=0.001$ level). Subjects' responses to the two questions 1 ($r=0.71$, $n=95$), questions 2 ($r=0.65$, $n=95$), questions 3 ($r=0.83$, $n=95$) and questions 4 ($r=0.78$, $n=95$) in each trial, were strongly related.

Data from attributions made by subjects after trial one were analysed using Analyses of Variance (Anova procedure from SPSS-Nie et al, 1970) with Type (A/B) and social condition (alone/observer/mirror) as independent variables. No significant main, or 3-way interaction effects were found but significant 2-way interactions were found for subjects' ratings of their intention to try harder on trial two ($F=5.02$, $df=2,96$, $p=0.009$) and of the importance of luck ($F=3.28$, $df=2,94$, $p=0.042$). The effect for intention to try harder is graphed in figure 1 (means, standard deviations and subject numbers are reported in appendix J.3). The analyses for these effects are reported in appendix J.4. The figure indicates that Type A subjects varied in their attributions across social conditions in their intentions to try harder, while Type B subjects did not. Within the Type A group, those who were alone intended to try harder on trial two, while those in the mirror condition, on average, indicated that they intended to try as hard as they had in trial one.

Figure 1: Mean ratings of intention to try harder on trial two of experiment two by Type and Condition (a low score denoted intention to try harder)

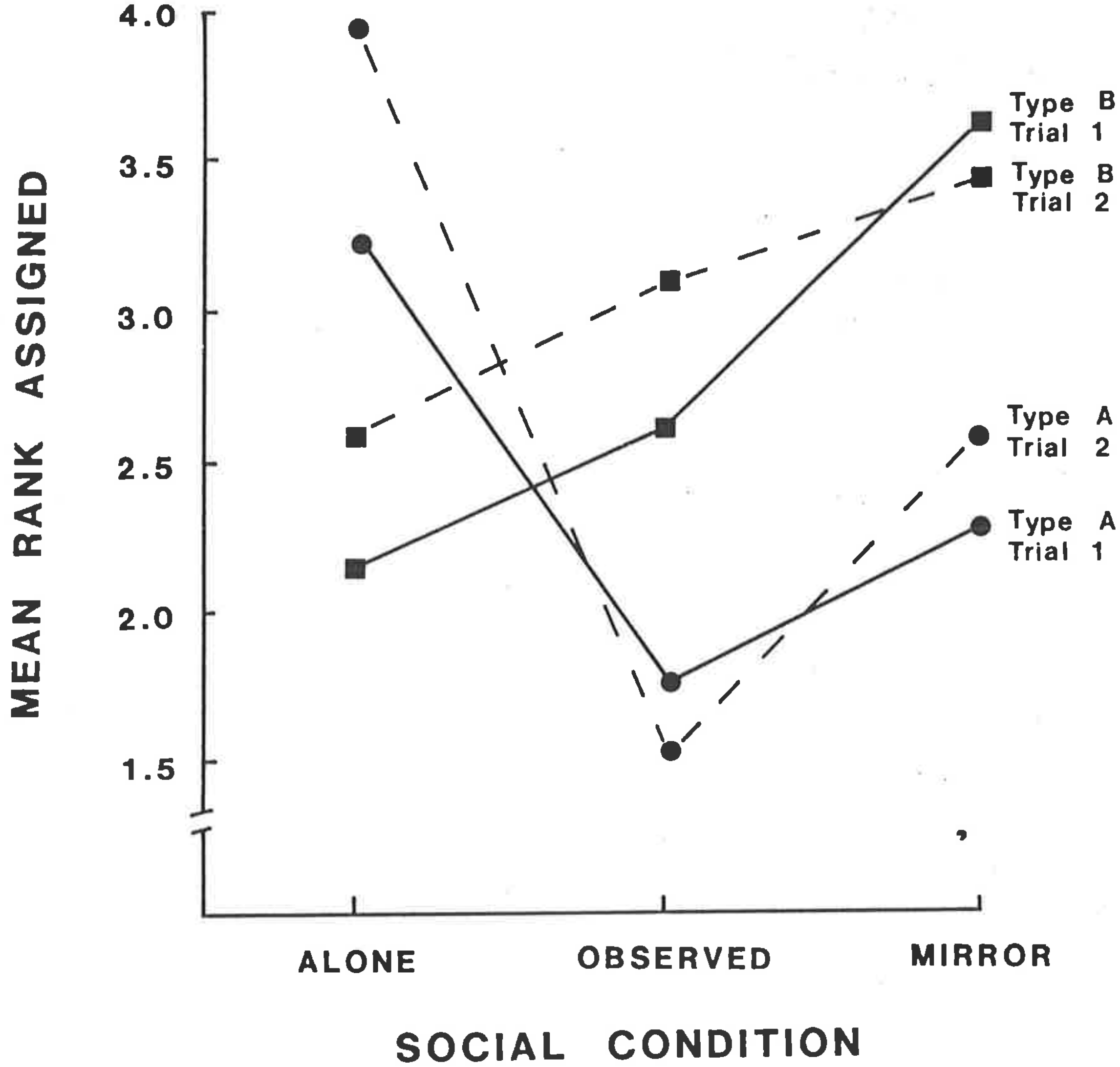


The effect for luck is graphed in figure 2 (means, standard deviations and subject numbers are reported in appendix J.5) and is described below. Similar analyses were carried out on the attributions data from trial two with false feedback (none/positive/negative) being included as a third independent variable. The only significant effect to emerge was a 2-way interaction effect of Type and social condition on subjects' ratings of the importance of luck as a factor affecting their performance (F=3.98, df=2,94, p=0.023). This effect is included in figure 2 (means, standard deviations and subject numbers are reported in appendix J.6 and data from the analyses are reported in appendix J.7).

From figure 2 it is apparent that the effects for ratings of luck were very similar in both trials of the task. As with the effect for intention to try harder, the attributions of Type A subjects are greatly affected by the social condition. When alone they see luck as somewhat a factor but see it as less important in the mirror condition and even less important still in the observed condition. Type B subjects are less affected by the social condition, seeing luck as relatively unimportant when alone, slightly more important when they are observed and slightly more important again in the mirror condition.

Further analyses of the attributions data from both trials were carried out using a multivariate analysis of variance procedure (Manova-SPSS, Nie et al, 1970). These analyses failed to indicate that any significant effects

Figure 2: Mean rating of the importance of luck as a factor affecting performance on trials one and two of experiment two by Type and Condition



other than those already reported from the univariate analyses were to be found in the data from either trial of the task. These analyses failed to clarify any further the univariate effects.

9.3.1 The effects of intentions on performance

In an effort to determine whether subjects' performance levels were related to their intentions a series of analyses of covariance were run (SPSS-Nie, et al, 1970). All performance indices (number of errors, number correct and latencies for correct responses) for trial two were analysed by the independent variables with subjects' ranking of "intention to try harder on trial two" as a covariate (in each analysis). As with the univariate analyses reported in chapter 7, only False Feedback affected significantly subjects' performance in these analyses. The manipulation of false feedback gained significance as a main effect, with intention to try harder as a covariate, on the number of errors made during trial two (F=4.78, df=2,96, p=0.011; details of this analysis are presented in appendix J.8).

Covarying intention to try harder in this analysis yielded a slightly greater F-ratio than was produced in the univariate analysis reported in chapter 7 (F=3.96, df=2,97, p=0.023). Thus intention to try harder, although not a significant correlate of performance measures, did act to mask somewhat the influence of False Feedback manipulation. The effect of covarying intention to try harder was to make the effect of feedback on number of errors more extreme. The unadjusted means (for number of errors on trial two) indicated that subjects who received no feedback (mean=0.74) and positive feedback (mean=0.84) made about the same number of errors but those who received negative feedback made almost twice as many errors (mean=1.61). A very similar effect is evident for the adjusted means from the covariance analysis. Adjusted mean numbers of error are very similar to unadjusted means for subjects who received no feedback (mean=0.73) and positive feedback (mean=0.85) but the adjusted mean number of errors for subjects who received negative feedback is noticeably higher (mean=1.67) than the unadjusted mean.

It seemed reasonable to hypothesize that subjects' intention to try harder might be reflected in an improvement in trial two performance over performance in trial one rather than just in their level of performance in trial two. Difference scores were computed for the performance indices by subtracting trial one performance from trial two performance. These difference scores, for each of the indices, were then analysed with Type, Social Condition and False Feedback as independent variables and intention to try harder as a covariate. The outcome of these analyses was very similar to the outcome of the covariance analyses of the trial two performance indices already reported. False Feedback was significant as a main effect on change in number of errors with intention to try harder as a covariate (F=6.84, df=2,96, p=0.002; details of this analysis are reported in appendix J.9). The F-ratio from this analysis is greater than that reported for the similar analysis of errors made on trial two (reported previously). Thus it appears that subjects' intentions did contribute to the variability of the trial two number of errors and contributed to a greater extent to the variance in change in number of errors data between trials of the task.

Thus intention has a noticeable masking effect on the effect of the false feedback manipulation on number of errors which subjects make on trial two of the task (and on change in number of errors). It is likely that intention and performance on trial one may interact to mask the effect of false feedback on number of errors on trial two. As an example, subjects who feel that they have not performed well during trial one (eg. they made a number of errors) may undertake to try harder on trial two. Subsequent positive feedback may lead them to attribute their errors to performing quickly, allowing them to decide not to work quite as hard as their stated intention. If these same subjects had received negative feedback, however, they might decide that they need to work extremely hard on trial two.

Thus it seemed appropriate to carry out similar analyses of trial two performance indices to those reported above but to include, as covariates, trial one performance indices (number of errors, number correct and latencies for correct responses) with intention to try harder in each analysis. The only significant effect found was for number of errors on trial two (this analysis is reported in appendix J.10). Number of errors on trial one naturally correlated with number of errors on trial two in this analysis ($F=25.68$, $df=1,96$, $p=0.001$). The magnitude of the effect of the false feedback manipulation on number of errors on trial two was almost identical to that found in the analysis which employed change in number of errors ($F=6.71$, $df=2,96$, $p=0.002$).

This analysis including performance indices from trial one only slightly alters the nature of the effect reported above for the effect of feedback on number of errors (on trial two) from the analysis which just covaried subjects' intention. The addition of indices of previous performance to this covariance analysis has no effect on the mean number of errors made by subjects who did not receive feedback (in both analyses the mean was 0.73). A slight decrease is evident in the adjusted mean number of errors made by subjects who received positive feedback (mean=0.81 compared to mean=0.85 in the previous analysis). A slight increase can be observed in the adjusted mean number of errors made by subjects who received positive feedback (mean=1.70 compared with mean=1.67 in the previous analysis).

9.3.2 The effect of performance on attributions

The possibility that subjects' performance level might be reflected in their attributions was also investigated. After trial two subjects were asked to rate how happy they were with their performance. It seemed reasonable to hypothesize that those who performed well would be happier with their performance that those who performed poorly. Subjects' final rankings of how happy they were with their performance on trial two of the task were analysed, with Type, Social Condition and False Feedback as independent variables and with all trial two performance indices as covariates. Number of anagrams correct on trial two gained significance as a covariate in this analysis ($F=21.84$, $df=1,96$, $p=0.001$; details of this analyses are reported in appendix J.11) but in this analysis the independent variables still failed to have a significant effect on subjects' ratings of happiness with performance. Feedback had an effect in this analysis which approached a conventionally accepted level of significance ($F=2.43$, $df=2,96$, $p=0.096$). While it is not appropriate to make a great deal of a marginal effect such as this, it did indicate that False Feedback may also relate to actual performance in affecting subjects' feelings about their performance.

The failure of a majority of these analyses to reveal any significant and systematic relationships between subjects' performance and attributions is not surprising, given the lack of significant interaction effects in the performance data. Details of multivariate analyses are not reported here due to their failure to provide further useful information to the analyses that have been reported.

The problem of low numbers of subjects in individual cells of this experimental design was discussed in chapter 7. This was less of a problem in the analyses of attributions data however, as the false feedback manipulation had no significance as a main or interaction effect in the data reported from trial two (thus the smallest effective cell number in the reported analyses was 12). The other problems with experiment 2 (discussed in chapter 7.4) continue to cast doubts upon the data reported here.

9.4 Discussion

9.4.1 Intentions and performance

In this experiment both the task and the experimental procedure were designed to produce a stressful, demanding situation; all subjects were expected to work at, or near, their peak capacity. Even although the task used in experiment two may not have been quite as difficult as that employed in experiment one, the experimental procedure and situation were expected to be experienced as stressful. Type A individuals in particular were expected to experience the situation, procedure and task as demanding, as they have been found to work as hard as they can, even when this is not a specific requirement of the situation (eg. Burnham, Pennebaker and Glass, 1975). The fact that subjects' intentions are not related to their performance level on trial two or to any change in performance level after trial one may indicate that subjects were working as hard as they could. Thus they may have intended to try harder (from their mean rating it seems that most subjects expressed an intention to try harder) but were already working so hard that this intention had no noticeable effect on performance.

In particular Type A subjects were expected to indicate an intention to try harder on trial two of the task, as their general strategy in performance situations appears to be to work harder than competitors (eg. Glass, 1977b) and to hold unrealistically high standards for their performance in demanding situations (eg. Grimm and Yarnold, 1984). From the significant interaction between Type and Social Condition for subjects' intention to try harder on trial two (figure 1), it is apparent that only Type A subjects who were alone intend to try a great deal harder.

Thus, Type A subjects in the alone condition give a predictable response but Type A subjects in the mirror condition indicate an intention to put in only the same effort as in trial one. If they were working as hard as possible, this response by Type A subjects seems to be reasonable although somewhat atypical. Mirrors have been found elsewhere (eg. Duval and Wicklund, 1972; Carver and Scheier, 1981) to enhance subjects' self-awareness. Therefore the presence of a mirror may have made Type A subjects aware that they were working as fast as they could. Perhaps it is in response to such a realization that they indicate an intention only to work as hard as they had on trial one. In the alone condition, Type A subjects may not be aware that they are working as hard as they can, just as they have previously been shown not to be aware of their physical symptoms (eg. Weidner and Matthews, 1978) and of their level of fatigue (eg. Carver, Coleman and Glass, 1976).

The Type A subjects in the observed condition and all of the Type B subjects indicate by their mean ratings that they intend to try only marginally harder during trial two of the task. The Type B subjects' attributions are not affected by the social condition. They may just be unresponsive to this manipulation as their performance in experiment three appeared to be less responsive to the effects of the social conditions than the performance of Type A subjects. It seems more likely however, that Type B subjects have more realistic standards for their own performance which are salient to them independently of their social situation. They may indicate that they will try slightly harder realizing that that is the most they can possible manage but at the same time wishing to give an answer which is socially acceptable. Subjects would be unlikely to be willing to indicate an intention to try less on trial two, as the experimenter had asked them to perform as well as possible on the task. In the observer condition Type A subjects manifest a similar response to Type B subjects. Thus they may also become self-aware (that they are unable to perform much better) and socially aware (that they should indicate an intention to try a little harder) in this observer condition.

This explanation of the data also presupposes that Type B subjects are normally aware of their own standards and public standards and that this awareness is unaffected by their social situation. An alternative hypothesis is that Type B individuals do not possess strong standards for their performance so that self-awareness manipulations do not greatly affect their attributions or their task performance.

The notion that Type B individuals have more realistic standards for their performance than Type A individuals, however, has been supported by other research. Grimm and Yarnold (1984) found that Type B individuals set performance standards with reference to their previous level of performance. They found that Type A individuals tended to ignore their previous performance in setting standards which were often unrealistically high. In the effect for subjects' ratings of intention to try harder (figure 1), Type B subjects report conservative but socially acceptable standards by indicating that they will try slightly harder (on average) during trial two. Importantly, these attributions are unresponsive to the social situation whereas the ratings made by Type A individuals are responsive to their social situation. The fact that intentions may not be reflected in behaviour must also be borne in mind, however, although (as already discussed) Type A subjects may intend to try harder but may be working as hard as they can. Given the doubts expressed in chapter 7 about experiment two, it is not appropriate to give a great deal of weight to this effect.

The series of covariance analyses involving number of errors, trial one performance indices and subjects' intentions on trial two did not yield further information about the effects of Social Condition and false feedback on Type A and B subjects. These analyses did, however, indicate that subjects' performance was affected by their stated intention, their previous performance and the feedback which they received about it. This offers evidence that the task and attributions items were seen by subjects as reasonable and consistent.

The series of covariance analyses indicated that the strength of the effect of feedback on errors made during trial two was maximized by removal of the variance associated with subjects' intention and previous performance (either by computing change scores or by including trial one performance indices as covariates). The adjusted means produced by the covariance analyses did not differ from the unadjusted means by great enough margins to support speculation about underlying causes. As it seems to have no potential to provide any information about the effects of their social situation on Type A and B subjects, such speculation would not be relevant to this thesis.

9.4.2 Attributions Concerning Luck

The effects for subjects' attributions about luck after trials one and two are very similar. This is despite the fact that the process of making attributions is strongly suspected of making subjects self-aware of public performance standards (discussed in chapter 7.4). There are two possible explanations for the similarities between these effects for subjects' ratings of luck. Firstly, it is possible that subjects' attributions are not affected by having previously made attributions. This seems unlikely, given the fact that attributions data from an experiment reported in appendix E were just so affected.

The second possible explanation is that subjects remembered the attributions which they made after trial one and made the same or similar attributions after trial two, in order to appear consistent. The fact that subjects' attributions on similar items after trial two were very strongly correlated with their attributions after trial one, tends to support this notion. This may also serve to explain the lack of effect from the false feedback manipulation on subjects' attributions. This manipulation significantly affected subjects' performance during trial two (see chapter 7.3 and 7.4) but did not gain a conventionally accepted level of significance as a main effect on their attributions. False feedback was marginally significant as a main effect, however, in the analysis of subjects' ratings of happiness with their performance, with performance indices from trial two as covariates. While this effect cannot be treated as having any great consequence, it is encouraging to note that feedback was associated with actual performance in marginally affecting subjects' feelings about their performance.

This does not preclude the possibility that subjects tended to make attributions in response to a desire to appear consistent, rather than in response to their actual beliefs about factors which affected their performance during trial two of the task. Thus attributions data from trial two must continue to be interpreted with some caution. In their attributions about the importance of luck subjects' ratings may also have been influenced by what they considered to be socially acceptable. All subjects appeared unwilling to admit that their performance has been helped to any great extent by luck (the highest mean rating for any group is 3.93 for Type A subjects in the alone condition). It is interesting that when observed, Type A subjects give luck virtually the lowest possible mean rating during both trials of the task. They are obviously extremely reluctant to admit that luck has had even the slightest influence on their performance. If the presence of an observer is making some public performance standard salient, obviously luck plays no part in it. This is consistent with the view of Type A behaviour as a coping strategy (e.g Glass, 1977b). A public admission by Type A individuals that luck is important to their performance hardly supports the impression that they are in control.

Support for this finding also comes from Brunson and Matthews (1981) who report attributions made by Type A and B subjects during an insoluble task. Whereas Type B subjects verbally reported that chance and task difficulty were factors affecting their performance, Type A subjects tended to see their own lack of ability as a factor. When alone in the present experiment, Type A subjects are prepared to admit that luck had some bearing on their performance but are less willing to admit that this is the case in the mirror condition. Even if the mirror does serve to enhance the level of self-awareness of Type A subjects, it has not completely overcome their aversion to considering that luck may have been a factor affecting their performance. It appears that a standard promoting control becomes salient to Type A subjects in both mirror and observed conditions. The ranking which these subjects give to luck in the mirror condition seems to have been tempered by increased (self-) awareness that luck may have played some part in their performance.

Once again the manipulation of social condition has had very little effect on attributions concerning luck made by Type B subjects. Type B subjects appear not to possess any strong standards concerning luck. They are slightly more willing to see luck as a factor in the mirror condition than when they are observed. When alone Type B subjects give luck a slightly lower (mean) rating than when they are observed. It appears that Type B subjects are not greatly affected by the mirror and observed conditions, other than to become slightly more aware of the possibility that luck has affected their performance.

9.4.3 Attributions Concerning "Happiness with performance"

Extensive analyses of performance and attributions data indicated that the only attribution which subjects made that affected, or was affected by their performance, was their rating of how happy they were with their performance on trial two of the task. As already discussed, it was the number of anagrams which subjects solved correctly and not the number of errors which they made that gained significance as a covariate. Of the independent variables, only the feedback manipulation gained marginal significance as a main effect. Thus despite the problems with experiment two discussed previously, subjects attributions were affected by the feedback (marginally) and by the number of anagrams which they solved correctly during trial two. This makes sense as it is reasonable for subjects to relate happiness with their performance both to number of correct solutions during trial two and to feedback about speed of performance on the first trial of the task. The consistency of this effect serves to encourage some confidence in dealing with effects from experiment two. Such confidence is also encouraged by the fact that a very similar effect for ratings of happiness was found in experiment three.

9.5 Introduction: Attributions from Experiment Three

Experiment three was designed to be a conceptual replication of experiment one, while overcoming many of its shortcomings and those of experiment two. Attributions questionnaires employed in experiment three were virtually identical to those employed in experiment two. Subjects were not required to answer questions after trial one unless they were assigned to the "attributions" condition. For subjects in this condition answering attributions questionnaires became a manipulation of social situation rather that a source of data. All subjects were asked to complete questionnaires after trial two of the task.

The attributional process was expected to increase self-awareness when used as a manipulation of social condition. Thus it might be expected to make private standards salient by forcing subjects to introspect but, as they would also realise the availability of their attributions to "public" (the experimenter's) scrutiny, this manipulation might make public standards salient. The hypothesis therefore, was that Type A and B subjects would respond to the attribution condition in much the same way as they had to the presence of an observer.

9.6 Method

The data reported here were collected during experiment three which is reported in chapter 8. In this experiment the process of completing attributions questionnaires after trial one of the task became a manipulation of subjects' social situation. Only subjects in the "attribution" condition completed a questionnaire concerning factors affecting their performance after trial one. All subjects completed attributions questionnaires after they finished trial two of the task. Full details of methodology of this experiment are provided in chapter 8.3. It should be noted that all subjects received positive feedback after they had initiated trial two of the task. Thus this feedback could not affect those attributions made after trial one. It should also be recalled that an additional group of subjects (Type X) who were neither Type A nor Type B took part in this experiment.

9.6.1 Attribution Questions

The attributions questionnaires completed by subjects in this experiment were very similar to those employed in experiment two. The only difference was that the trial two questionnaire referred to the task as a whole rather than asking subjects to make attributions about factors affecting their performance on trial two (copies of these questionnaires are included in appendix J.12 and J.13).

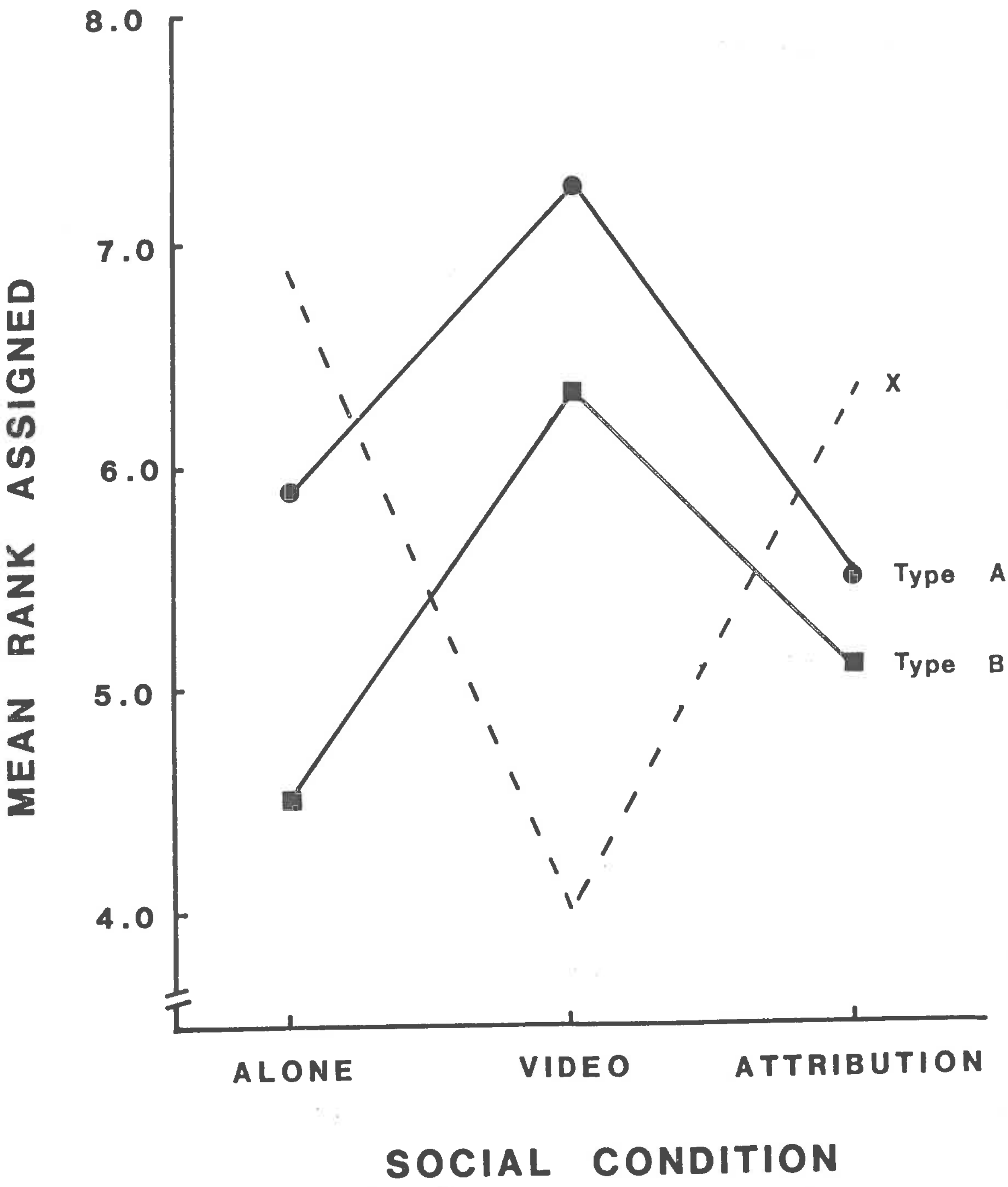
9.7 Results

As with experiment two, subjects' responses to similar items after both trials correlated significantly. Eighteen subjects completed attributions questionnaires after both trials of the task (these were subjects in the "attribution" condition). There was a moderate correlation for both questions 1 ($r=0.47$, $p=0.025$) and strong correlations for questions 2 (r0.71, $p=0.001$), questions 3 ($r=0.90$, $p=0.001$) and questions 4 ($r=0.83$, $p=0.001$).

The trial one attributions data from subjects in the "attributions" condition were analysed using analysis of variance (SPSS-Nie *et al*, 1970) with Type (A/B/X) as the independent variable (all subjects in this condition completed the task alone). No significant effects were found.

No significant main effects for Type or social condition (alone/video/attribution) were found in analyses of the data from the post-task attribution questionnaires. A significant 2-way interaction effect of Type and social condition was found for subjects' ratings of the importance of amount of effort ($F=3.01$, $df=4, 60$, $p=0.026$). This effect is graphed in figure 3, details of the analyses are reported in appendix J.15 (means, standard deviations and subject numbers are reported in appendix J.14). The figure indicates that Type A and B subjects make similar ratings across the social conditions, seeing effort as more important in

Figure 3: Mean ratings of the importance of amount of effort as a factor affecting performance during experiment three by Type and Condition

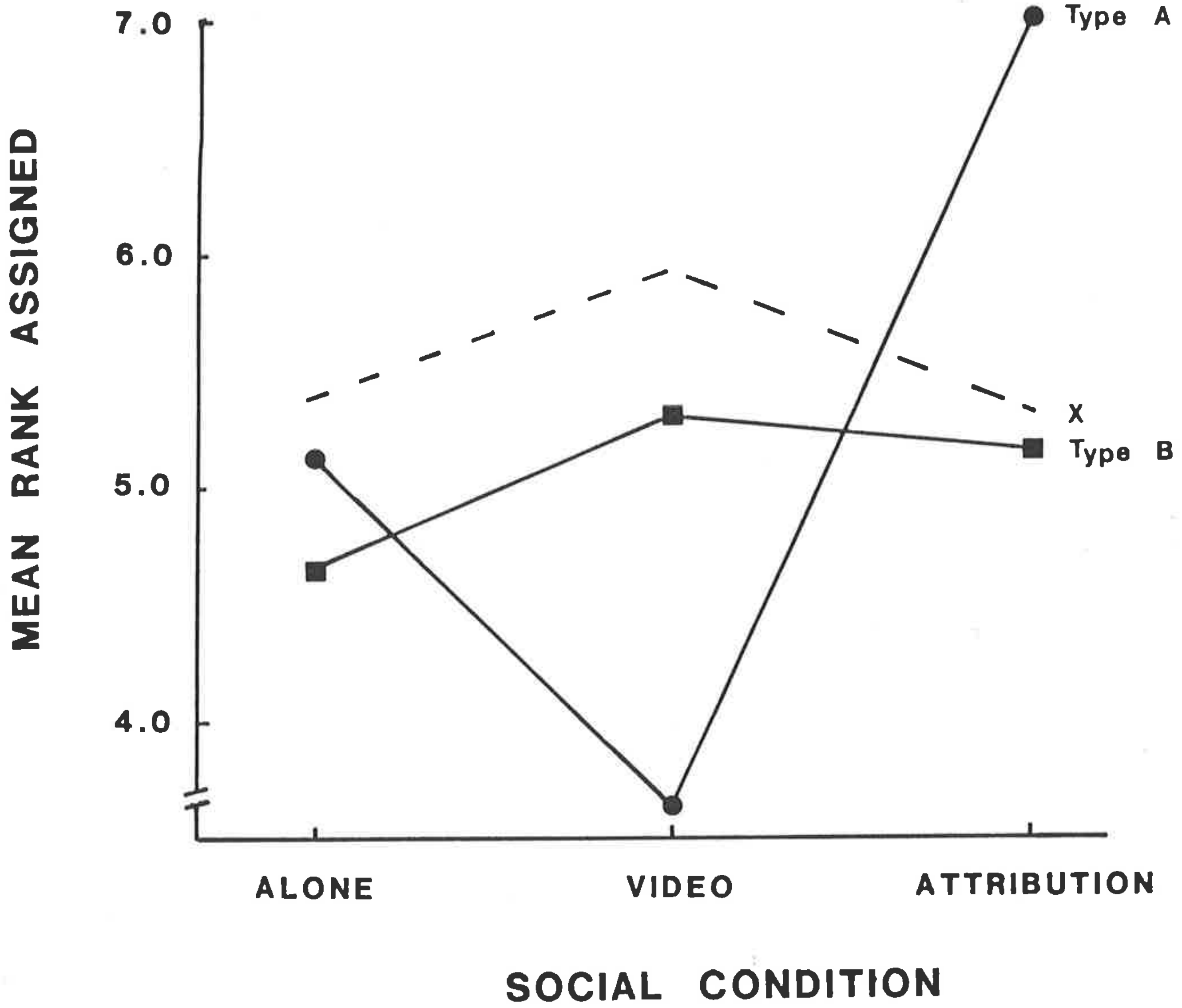


the video conditions than in the alone and attribution conditions. Type X subjects manifest almost the direct opposite pattern of data, seeing effort as reasonably important in the alone and attribution conditions and as relatively unimportant in the video condition.

A significant 2-way interaction was also found for subjects' rating of how happy they were with their performance on the task ($F=2.43$, $df=4, 60$, $p=0.015$). This effect is graphed in figure 4 and details of the analyses are reported in appendix J.15 (means, standard deviations and subject numbers are reported in appendix J.16). The figure indicates that Type A and X subjects are similarly unresponsive to the Social Conditions in indicating that they are reasonably happy with their performance. Type A subjects were greatly affected, on average, by the social conditions. Those who are alone indicate that they are reasonably happy with their performance, those in the video condition are happier but those who completed attributions items after trial one of the task are quite unhappy with their performance (note that a low score indicates happiness with performance <u>on the whole task</u>).

These initial analyses failed to replicate the effect found for subjects' ratings of the importance of luck in the attributions data from experiment two. The attributions data were subject to analyses of variance without the inclusion of data from the Type X subjects (as a group of such subjects had not taken part in experiment two). A significant interaction was found

Figure 4: Mean ratings of happiness with performance during experiment three by Type and Condition

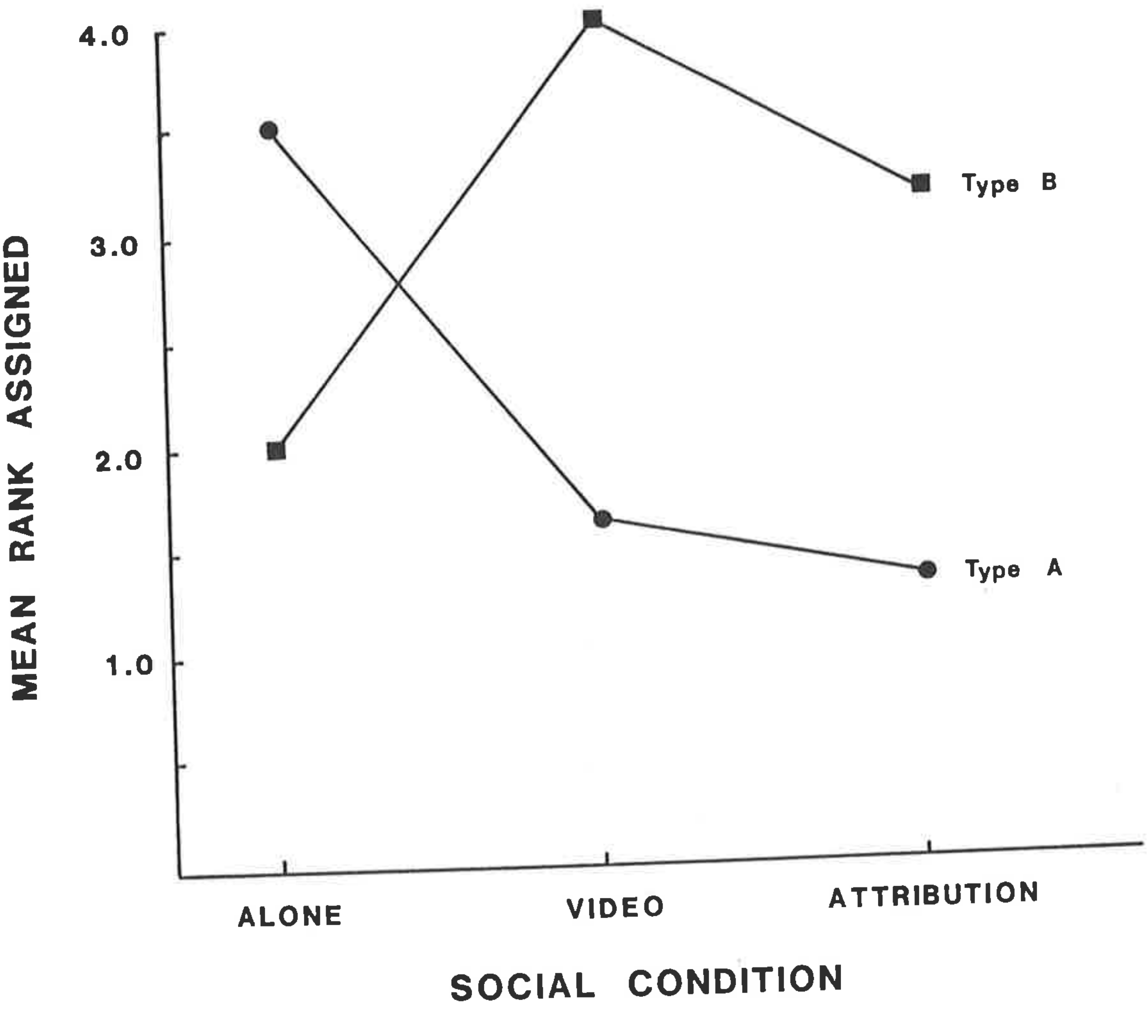


between Type (A/B) and social condition for subjects' rating of luck as a factor affecting their performance ($F=3.84$, $df=2, 39$, $p=0.031$). This effect is graphed in figure 5 and details of the analyses are reported in appendix J.18 (means, standard deviations and subject numbers are reported in appendix J.17). From figure 5 it is apparent that Type A and B subjects were affected quite differently by the social conditions. Type B subjects see luck as unimportant in the alone condition but as more important in the video and attribution conditions. Type A subjects give luck a higher rating when alone than when videotaped or having made attributions after trial one. It is worthy of note that, as in experiment two, all subjects (on average) give luck a low rating. The highest mean rating was made by videotaped Type B subjects who indicate that they do not even consider luck as "somewhat" a cause of their performance.

As with the attributions data from experiment two, the data from this experiment were analysed using multivariate techniques. These analyses failed to indicate the existence of further significant effects and also failed to provide any clarification of the effects already reported from the univariate analyses.

Similar covariance analyses to those run on data from experiment two were carried out on performance indices and attributions data from this experiment. As only 18 subjects completed questionnaires after trial one, analyses to determine whether intention to try

Figure 5: Mean ratings of the importance of luck as a factor affecting performance during experiment three by Type (without Type X subjects) and Condition



harder was related to performance level, not surprisingly, failed to yield any significant effects. Covariance analyses of subjects' ratings of how happy they were with their performance were carried out with performance indices as covariates. As subjects had been asked to answer final attributions questionnaires as relating to both trials of the task, performance indices from both trials were included in these analyses.

Separate analyses which covaried trial one and two number correct, number of errors and latencies for correct responses were run. Only number correct on trial two was found to be a significant covariate in these analyses (F=8.16, df=1,60, p=0.006; details of this analysis are provided in appendix J.19). With the trial one and two number correct covaried out of this analysis, Social Condition gained significance as a main effect on happiness with previous performance (F=3.42, df=2,60, p=0.041; details in appendix J.19). Social condition had not attained a conventionally accepted level of significance in the previous analysis (F=1.94, df=2,60, p=0.154; analysis of variance). In this covariance analysis the previously significant (see appendix J.15) interaction of Type and social condition fails to attain an acceptable level of significance.

From figure 4 it is apparent that this interaction gained significance mainly due to the strong response of the Type A subjects to the social conditions. It may be that this pattern of attributions was actually produced in response to their previous performance (in terms of number correct on trial two) as without inclusion of the variance associated with these performance indices, the interaction effect is replaced with a main effect for condition. The original effect of condition on mean ratings of happiness is very little changed by removal of the covariates. The covariance analysis has made the mean rating for subjects in the alone (original mean=5.09 and adjusted mean=4.84) and mirror conditions (original mean=5.83 and adjusted mean=6.05) slightly more extreme. The covariance analysis had a negligible effect on the mean rating by subjects in the observed condition (original mean=4.90 and adjusted mean= 4.99) however.

It is not possible to say, from these analyses, whether Type A subjects' performance and attributions are responsive to their social condition or whether only their performance is responsive to social condition and their attributions are responsive to their performance. There may be no point in struggling with such a distinction, however, as the important fact seems that the attributions made by Type A subjects appear to be related to their previous performance and their performance is responsive to their social situation. Neither of these relationships appear to hold for Type B subjects. This finding is also supported by correlational analyses in the case of error data.

Further analysis using simple correlational techniques (Pearson Product-moment) indicated that subjects' rating of how happy they were with their performance on the task and the number of errors which they made during trial two were correlated ($r=0.20$, $n=60$, $p=0.066$) but that this correlation only reached an acceptable level of significance for Type A subjects ($r=0.48$, $n=22$, $p=0.011$).

9.8 Discussion

9.8.1 Attributions concerning amount of effort as a factor affecting task performance

The effect for subjects' ratings of the importance of "amount of effort" as a factor affecting their performance (graphed in figure 3) is inconsistent with the other effects for attributions and performance data effects from experiment three. Generally Type A subjects have been affected differently from, and to a greater extent than, Type B subjects by the different social conditions employed. Type X subjects have tended to manifest patterns of performance data in response to the social manipulations which were quite similar to the patterns manifested by Type B subjects (see figures 1 and 2 in chapter 8).

In the effect for subjects' ratings of the importance of amount of effort Type A and B subjects respond to the manipulation of social condition in very similar fashion. The Type X subjects manifest a markedly dissimilar pattern of mean ratings however. Type A subjects give effort a higher (mean) rating in all social conditions than Type B subjects but this difference is not significant ($F=1.95$, $df=1, 39$, $p=0.17$). Type A and B subjects in the alone and attribution conditions see amount of effort as a factor which somewhat affected their performance but those in video condition give it a higher (mean) rating. The Type X subjects rate effort as being fairly important to their performance in the alone and attribution conditions and as having relatively little importance in the video condition.

There are a number of reasons for discounting this effect. It appears that it may just be a random effect which does not add to or elucidate the theory being developed to explain the more consistent body of data already reported (discussed in chapter 8 and developed further in section 9.9 of this chapter). Apart from the problems outlined above, there are a number of other reasons for discounting this effect. Firstly, no such effect was found for this attribution item (importance of "amount of effort") in the attributions data from experiment two (analyses of experiment two performance data from subjects who received false positive feedback also failed to yield any such effect). Secondly, in no other effect reported in this thesis have Type A and B subjects responded so similarly to a social manipulation. Finally, this effect may be discounted due to its uninterpretability; it does not make sense in terms of data reported here or in any other relevant published research. The existence of this effect for subjects' ratings of amount of effort serves to provide a caution, in warning against the temptation to make too much of other, more consistent and interpretable findings.

9.8.2 Attributions concerning happiness with previous performance

The effect shown in figure 4 is consistent with the performance data reported in chapter 8 (figures 1 and 2). Type B and X subjects' ratings of happiness with their performance are very little affected by the manipulation of social condition. The mean ratings by all Type B and X subjects indicate that they are satisfied with their previous performance. This is consistent with what is known about performance standard setting by Type B individuals. Type B subjects in Grimm and Yarnold's (1984) study set realistic standards, something which Type B subjects in this study might also be expected to do. With reasonable standards for their performance, and being less motivated by needs to control their environment (eg. Glass, 1977b) and to achieve (eg. Friedman and Rosenman, 1974) than Type A subjects, Type B subjects might be expected to evince satisfaction with their performance in most situations. Type A subjects, according to the evidence of this previous research, should generally be unsatisfied with their performance. However, the Type A subjects who completed the task alone also indicated (by their mean rating) that they were satisfied with their task performance in this experiment. Earlier in this chapter it was suggested that Type A subjects might only possess vague standards for their own performance when unself-aware (in the alone condition in experiment two). It was suggested that the main standard salient to them in this condition might be a generalized intention to try harder (as was shown by their mean rating in figure 1). It does not appear that this intention to try harder results from dissatisfaction with previous performance.

Surprisingly the mean rating of happiness made by Type A subjects in the video condition indicates that they are quite happy with their performance. In fact, only the Type A subjects in the attribution condition gave, what might be the expected response (from subjects who strive to control and achieve), in indicating that they were not happy with their task performance.

These attributions may not serve to elucidate the nature of situationally determined performance standards held by Type A subjects, however. The ratings of happiness with performance by Type A subjects and the number of errors which they made during trial two are significantly correlated. Thus Type A subjects may produce ratings on this dimension in response to their actual performance. Type A subjects made a greater number of errors in the attribution condition in experiment three. These subjects appear to be unhappy with this poor performance (from their mean rating in figure 4).

From the covariance analyses it was evident that the number correct on trial two contributed to the interaction effect which Type and Social Condition had on subjects' ratings of happiness with their performance. This interaction failed to attain a conventionally accepted level of significance with the removal of the variance associated with the number of anagrams which subjects solved correctly. It was suggested that, as Type A subjects were most affected by the Social Conditions (see figure 4), then they were probably most responsive to the number of anagrams which they solved correctly in rating how happy they were with their performance. This seems a reasonable presumption, given the correlational evidence that Type A subjects' ratings of happiness were related to the number of errors which they made. There was not a significant correlation between these ratings and number correct for Type A subjects, however, which casts doubt on this presumption. Taking all of these findings together does encourage the conclusion that Type A subjects are more responsive to both their social situation and to their previous performance in rating happiness than Type B and X subjects.

In chapter 8 it was suggested that the performance effects found for number of errors and for number correct were produced by the standards which were made salient, especially to Type A subjects, by the differing Social Conditions. Subjects' attributions about happiness with performance may well be affected by these same standards thus creating the previously reported pattern of correlations, and perhaps the effects found in the covariance analyses. The nature of standards which might produce these, and the other performance and attributions data effects reported here are discussed in some detail below with reference to the effect found for subjects' ratings of the importance of luck.

In terms of their attributions about happiness with performance, number of anagrams which subjects solved correctly seems to be the dimension of their performance which is of most importance to subjects. This was found to be a significant covariate both in experiment one and in experiment two. This may be partially an artifact of the task as subjects only had a vague idea of the latency of their performance but were given the correct solution to each anagram by the computer. Thus they had a continuous feedback about the accuracy of their performance. They may also have personalized their successes (correct responses) and have excused their failures (errors).

9.8.3 Attributions concerning luck

The significant interaction effect for subjects' ratings of the importance of luck (figure 5) as a factor affecting their performance is similar to the effect reported for ratings of luck in experiment two (figure 2). The alone/observer interaction shown in figure 2 for mean ratings by Type A and B subjects' in experiment two is replicated by the alone/video effect in this experiment (figure 5). The attribution condition has a very similar effect to the video condition, for both Type A and B subjects. In this interaction the video and attribution conditions both appear to make Type A subjects aware of a standard which precludes consideration of luck as a factor affecting their performance (this was previously hypothesized to be the standard which encourages Type A subjects to maintain a sense of control). In comparison, Type B subjects appear to become more willing to consider luck as a factor affecting their performance in the video and attribution conditions.

The effects for attributions data discussed here and in the discussion of attributions effects from experiment two (section 9.4) and the performance data effects reported in chapter 8 have the potential to provide information about the effects which the of manipulation of their social environment, may have on the performance strategies and standards of Type A and B individuals. Such an integrative discussion is presented below (in section 9.9). Before that discussion, the effect which the process of making attributions about factors affecting their performance has on subjects, must be determined.

9.8.4 <u>Performance standards and the process of making attributions</u>

The process of making attributions about factors affecting their performance was expected to enhance subjects self-awareness but it was not possible to predict the effect on subjects of them knowing that their attributions would be studied by the experimenter.

This may merely have tended to make public, rather than private, standards salient to subjects. However, it may create evaluation apprehension, especially as subjects might also tend to treat their attributions as public statements. The attribution condition has a similar effect to the video condition on subjects' attributions about luck. Thus it might be imagined to be making subjects publicly self-aware in the same fashion as the video manipulation. The performance of Type B subjects also supports this impression, as they make about the same number of errors in the video and attribution conditions.

Type A subjects react very strongly to this attribution condition in terms of their performance on the task (see chapter 8.4 and 8.5) in their attributions about happiness with their performance (figure 4). This may be due to it interfering with their performance during trial two in some way. If Type A subjects are interested in trying to prove themselves, as suggested by Friedman, Thoresen and Gill (1981), these subjects may tend to treat their attributions as public statements which they must "live up to" in subsequent performance. This explanation appears to be consistent with the data reported by Gatoy (1981) who found that Type A subjects publicly stated that they held high standards for themselves when they expected to take part in a competitive game. Gatoy did not, however, get subjects to compete so no evidence is available about the ability of these subjects to achieve their expectation.

Thus the attribution condition may have interfered with the Type A subjects' performance during trial two of experiment three by producing drive effects. It is possible that Type A subjects see themselves as having made a public statement that luck is not important to their performance and therefore try very hard to prove that this is the case but only succeed in making more errors on trial two. Type A subjects in the video condition also gave luck a very low mean rating however, while continuing to perform accurately on trial two of the task. Thus the attribution condition may affect Type A subjects by creating evaluation apprehension.

Previous research has shown that Type A individuals are motivated to perform well in a variety of situations (eg. Friedman and Rosenman, 1974; Glass, 1977b). Thus they may be particularly susceptible to drive effects produced by the process of making attributions for the experimenter's later perusal. They may see that not only their performance, but also their private thoughts, feelings and motivations are being assessed in the experiment. Type A subjects seem much more likely than Type B subjects, due to their competitive nature (eg. Friedman and Rosenman, 1974), to treat the attribution procedure as another kind of test. It is not hard to imagine Type A subjects worrying about doing well on the attributions "test" and being also strongly motivated to both giving the "right" answers and to perform in the manner that they predicted they would. With their less competitive orientation and minimal need to prove themselves (eg. Friedman, Thoresen and Gill, 1981), Type B subjects appear not to suffer such drive effects from making attributions.

Another possible explanation for the effect which the attribution condition had on the performance and attributions of Type A subjects can also be operationalized in terms of drive level. Dembroski and MacDougall (1978) found that Type A individuals preferred to wait to take part in a stressful experiment with others. These researchers presumed that this was due to the fact that these Type A subjects desired information about the way in which others reacted to and viewed the situation, to serve as a standard for their own behaviour. No such information was available in this experiment, yet Type A subjects appeared to possess specific standards and strongly indicated that luck was not a factor affecting their performance. The possibility that Type A individuals, as Matthews (1982) suggests, do not possessclear standards for their own performance must be entertained here however.

It is possible that Type A subjects may just apply a generalized standard concerning control to all situations. Confusion over the correct standard to apply to the experimental task may have been made salient to Type A subjects in attempting to complete attribution questionnaires. If this confusion persisted it may have produced drive effects resulting in the inaccurate performance by Type A subjects in trial two of experiment two. This explanation does not account for the strong effects which the varying social manipulations employed in experiments one, two, and three have had on the performance of Type A subjects. These effects offer strong evidence that Type A individuals hold specific performance standards. No confusion about standards is apparent in the effect found for Type A subjects' ratings of the importance of luck in experiments one and two. There is not even any indication of the Type A subjects exhibiting higher degrees of variability in their ratings than exhibited by Type B subjects (see appendix J.5 and J.6 for standard deviations). It seems certain that any confusion about standards would be manifested as high levels of variability in the attributions data from Type A subjects.

9.9 General Discussion

Evidence and discussion which indicates that the attribution condition employed in experiment three created drive effects have been presented previously. Experiment three was set up to employ manipulations of social situations which would minimize drive effects on subjects (see chapter 8.1) in order to elucidate the nature of their performance standards. Thus the attribution condition may tend to reflect drive effects rather that subjects' performance standards and is therefore treated with some caution in the following discussion.

Experiments one, two and three all employed a condition in which subjects performed alone and a social condition where they were observed (experiment two) or observable at some later time (the video condition employed in experiments one and three). The potential effects of a mirror are also discussed here but are not given great weight as a mirror was only employed in experiment two which has already been criticised. This discussion concentrates on the data from experiment three as this was the best controlled of the three experiments and yielded significant performance and attributions data effects. A series of t-tests which compared the mean in each cell for the significant effects previously reported, with the overall mean rating or score for that measure were carried out. This is a very conservative procedure which serves to indicate which social conditions had a marked effect on the performance or attributions of subjects (see table 1).

Table one offers further evidence that Type A subjects are greatly affected by, and responsive to, their social situation. Only one significant effect was found for Type B subjects and none at all were found for Type X subjects. The attribution condition had marked effects on both the performance and attributions of Type A subjects and affected the performance of Type B subjects significantly. A manipulation which produces drive effects might well be expected to have such marked effects on subjects however. It is also evident from this table that no cell mean deviated significantly from the overall mean for subjects' ratings of effort. The effect for effort has been explained as a random effect and the lack of any significant effects here

Table 1: Data on significance of deviations from cell means for the significant performance and attributions data effects found in experiment 3

	Alone	Video	Attribution
<u>Type A</u>			
errors	n.s.	$t=2.70$ (df=67) $p<0.005$ (<)	$t=3.16$ (df=65) $p<0.005$ (>)
correct	n.s	n.s.	n.s.
luck	n.s	n.s.	$t=3.65$ (df=67) $p<0.0005$ (<)
happy	n.s.	$t=2.20$ (df=65) $p<0.05$ (>)	$t=3.09$ (df=67) $p<0.005$ (<)
effort	n.s	n.s.	n.s.
<u>Type B</u>			
errors	n.s.	n.s.	n.s.
correct	n.s.	n.s.	$t=4.12$ (df=65) $p<0.0005$ (>)
luck	n.s.	n.s.	n.s.
happy	n.s.	n.s.	n.s.
effort	n.s.	n.s.	n.s.
<u>Type X</u>			
errors	n.s.	n.s.	n.s.
correct	n.s.	n.s.	n.s.
luck	n.s.	n.s.	n.s.
happy	n.s.	n.s.	n.s.
effort	n.s.	n.s.	n.s.

(<)-indicates cell mean is less than group mean
(>)-indicates cell mean is greater than group mean

appears to be due to the high levels of variability found in these data (standard deviations are reported in appendix J.14). This variability is particularly evident in the ratings from Type X subjects. It was the pattern of data from Type X subjects which produced the interaction effect reported in figure 3.

Attributions data from two experiments reported here support the hypothesis that Type A individuals possess different performance standards when normally self-aware and that differing standards become salient to them when their level of self-awareness is enhanced. These performance standards appear to affect the performance strategy (or strategies) which they adopt during a demanding task. The nature of some of these standards and strategies may be apparent from the data reported here.

From the attributions data it is apparent that the public standards (produced by the observer condition in experiment two and by the video condition in experiment one and private standards produced by the mirror condition in experiment two) held by Type A individuals do not concern luck. With what is known about the importance which Type A subjects attach to control, this is not at all surprising. What is interesting however, is that this standard appears to more salient to Type A individuals who are publicly or privately self-aware than those who are relatively unself-aware (alone). Type A subjects in the video condition in experiment three also performed well on the task, making few errors and a high average number of correct responses (chapter 8 figures 1 and 2). Thus Type A subjects appear to adopt a strategy which produces accurate performance and which they see themselves as being responsible for.

Type A subjects perform poorly in the attribution condition and report that they are unhappy with this performance. They rate luck as extremely unimportant in this condition however, as they did in the video condition. Thus, despite the drive effects associated with the attribution condition, this condition still appears to make public standards salient to Type A subjects. The reasons for this were discussed in chapter 8.2. Carver and Scheier (1981) suggest that any stimuli which reminds us of ourselves will enhance self-focus. Knowing that their attributions will be read by the experimenter, subjects are likely to experience enhanced awareness of public aspects of themselves and their performance.

Type B subjects who are publicly self-aware tend to see luck as more important than when they are alone. It is possible that they possess some public standard concerning the role of luck in their performance. It is also possible however, that the video just forces them to be more self-aware or self-critical, therefore making them recognise the contribution of luck to their performance. Type B subjects perform best (in terms of number correct and number of errors) in the attribution condition, in which they also saw luck as being somewhat a factor in their performance. This pattern of data indicates that the attribution condition may have also induced drive effects amongst Type B subjects. These effects resulted in better performance by the Type B subjects, either because thay experience less drive than their Type B counterparts or, because they were motivated to optimal performance by this drive (these possibilities are not mutually exclusive).

In general, the performance of, and attributions made by Type B subjects, were not greatly affected by the manipulation of their social situation. Thus it would appear that, while their level of self-awareness may be enhanced, no very strong standards become salient to them when this occurs. The performance of Type B subjects in experiment one was responsive to their social condition but this was mediated by the false feedback manipulation, and was therefore the effect was suspected of being a result of drive effects.

The preceding discussion has attempted to integrate findings from experiments one, two, and three. This discussion was not exhaustive in exploring alternate interpretations for the effects reported in this chapter for two main reasons. Firstly, the relative ambiguity of the effects, especially if treated separately to the performance effects reported earlier, ensures that the number of alternate interpretations would tend to be a function of the imagination of the author. Secondly, although a great number of explanations might be entertained, doubts about the veracity of the attributions data reported here would mean that such a degree of speculation is not warranted.

Serious reservations were expressed in chapter 7 about the methodology, number of subjects and method of subject selection employed in experiment two. These reservations obviously indicate a need for great caution in interpreting the effects of the independent variables on subjects attributions (concerning intention to try harder and luck) in experiment two. The fact that subjects intentions did not relate to their performance and that their attributions about luck were so similar on both trials of the task in experiment two does nothing to dispel these reservations. Thus the extremely conservative nature of the interpretations of data from subjects attributions during experiment two provided in this chapter seem entirely appropriate.

Although experiment three overcame many of the problems apparent in the design of experiment two, data from subjects attributions during this experiment have still been interpreted with great caution. The effect found for subjects' ratings of the importance of amount of effort was uninterpretable and must be suspected of being a random effect. This casts doubt upon the the other significant effects found for attributions in both experiment two and three. These doubts must not be seen as indicating that all attributions data from both experiments are of no value, however, as most are quite reasonably interpreted here with reference to the effects found for performance data and theorising form the research literature concerning Type A behaviour.

Perhaps the most important finding from the experimental data (performance and attributional) reported here, is the fact that Type A individuals appear to be more responsive to their social condition (or environment) than Type B individuals. This is completely contrary to the theorising of other researchers in the field. Matthews and Brunson (1979) believe that Type A subjects tend to ignore events which are peripheral to a demanding task. It is also evident from the data reported here that Type A individuals possess differing standards for their performance in differing social situations. It is not possible to determine the relative vagueness or specificity of these standards, however, in response to the contention by Matthews (1982) that standards held by Type A individuals are vague. It would appear however, given the fact that their performance and attributions are so markedly different in social (video or observed) and non-social (alone) conditions, that Type A individuals possess what must pass for specific, situationally determined standards for their own performance. Some of the ways in which this standard may be operationalized are discussed in the next (concluding) chapter.

CHAPTER TEN

10.1 Introduction

This chapter will present conclusions about the data reported here in the light of findings by other researchers. Such conclusions have been attempted in most of the data chapters of this work and will not be repeated, except where brief recapitulation is necessary to facilitate the integration of findings in this chapter. Some of the conclusions made in this chapter are rather speculative. Where this is the case an attempt has been made to entertain viable alternative interpretations and to outline why the chosen explanation or conclusion seems to be supported most strongly by the available data.

In this chapter an attempt will also be made to put the conclusions from this research into a broader perspective. This will be accomplished partly by dealing with findings or areas which appear to be problematic (or difficult to interpret) in the research reported here. Three such areas will be dealt with in some detail in this chapter:

1. The problem of what self-awareness is and how it is experienced.

2. Conceptualizing, in the light of the data reported here, the ways in which Type A and B subjects appear to experience, or avoid experiencing self-awareness.

3. Clarification of apparent situational factors determining the relationship between Type A and B behaviour and self-awareness.

This chapter (and thesis) will conclude with a discussion of the areas of research and practice in which the data reported here may have ramifications. Some implications of these data for those attempting to modify Type A behaviour, thereby reducing the associated risk of CHD development, are also dealt with in this chapter.

10.2 The Experience of Being Self-aware

Ashworth (1979) has proposed that there are two fundamental aspects or meanings of self. He refers to the self as knower and to the self as known in line with the distinction first made by William James (1892). Ashworth clarifies this distinction with the example:

"I have a self-concept".

He sees awareness of this or any other observable aspects of the self as constituting the self as known. The idea that:

"I myself have this concept",

is seen by Ashworth (1979, p. 91) as constituting the self as knower.

This distinction is very similar to that made by Duval and Wicklund (1972, discussed in chapter 6.1).

They characterized two mutually exclusive, alternating states of Subjective and Objective self-awareness. Objective self-awareness appears to be very similar to Ashworth's idea of the self as known. Duval and Wicklund proposed that, in this state, individuals observed themselves in the same "objective" manner as they usually observed other people or things in their environment.

Subjective self-awareness was characterized by Duval and Wicklund as a state in which the individual was involved in interacting with the environment but was also aware of stimuli originating with themselves (eg. perceptions of internal states, the self as a source of external perceptions, etc.). This is obviously the same state as that which Ashworth describes as the "self as knower". He proposes that this involves the individual having an awareness of the self while engaged in the perception of external objects. Ashworth (1979, p.92) provides an illustration of this process:

> "'I' have a perceptual presence even when entirely unself-consciously absorbed in an intricate task.".

This distinction between the knower and known or objective and subjective self-awareness was not made by Carver and Scheier (1981) whose model of self-awareness processes was largely adopted in the present work. Carver and Scheier prefer to characterize the individual as either spending no time self-aware (unself-aware) or as spending some significant proportion of time with attention focussed on aspects of the self (enhanced self-awareness or self-focus). These reearchers are vague about the actual proportion of time which individuals must spend self-aware to be classed as "self-aware". Carver and Scheier have also limited the scope of their theory in discarding Duval and Wicklund's distinction of objective and subjective self-awareness. It is difficult to explain the apparent avoidance of self-awareness by Type A subjects who had received negative feedback in experiment one (chapter 6.3 & 6.4) in terms of the Carver and Scheier approach.

10.3 Avoidance of Self-awareness by Type A Individuals

From experiment one it was apparent that Type A subjects were not responsive to the alone/video manipulation of self-awareness after they had received negative feedback about the speed of their previous performance. Thus Type A subjects appear to resist being self-aware when this state is potentially aversive to them. The problem in interpreting such a finding in this way is that these Type A subjects must be self-aware of their previous poor performance to prompt them to resist the usual self-awareness enhancing effects of the video condition. Such self-awareness should, according to the model proposed by Carver and Scheier (discussed in chapter 8.1), engage a self-regulatory feedback loop requiring the individuals to become aware of their performance standards which should, in turn, affect their performance. Obviously this process was not occurring amongst these Type A subjects. Neither does it seem reasonable to suggest that these subjects are "short circuiting" this system in some way. It is unlikely that they can become aware of their poor performance and then inhibit self-awareness of their standards as these standards are the guideline by which they must judge that their performance was in fact poor. Thus the model proposed by Carver and Scheier appears rather too limited to deal with this finding.

It is possible to develop the line of reasoning presented above to account for the observed pattern of data, in terms of a model of self-awareness processes suggested by Hull and Levy (1979), as an alternative to the Duval and Wicklund (1972) approach. These researchers offered evidence to support their theory that information about the self was encoded at a different level by the individual than other information. They did not suggest that such information about the self may also be hierachically encoded in the memory but if their first premise is acceptable, then this presumption is also reasonable.

In the present case it may be that Type A individuals categorize information about their performance as very important. This hypothesis is in keeping with the evidence that Type A individuals have very high performance standards (eg. Grimm and Yarnold 1984) and are very interested in maintaining good performance (eg. Glass, 1977b; Friedman and Rosenman, 1974). Thus the video manipulation may only serve to make Type A subjects aware of the "top priority" or most important, self-relevant information available, namely that they have performed badly. This may prompt them to get on with the task and ignore other self-relevant information.

It is still necessary to speculate, however, that there is some way in which these subjects can avoid becoming aware of other performance standards during these periods of self-focussed attention. The previous criticism does not appear to have been completely negated by this "level of encoding" theorizing as the standards for their performance held by Type A individuals must surely be very closely associated with information about previous poor performance and might be expected also to be coded as being very important. This is a fairly plausible interpretation of the data in terms of current self-awareness theory. Drive effects may, however, play a part in producing the pattern of performance data under discussion here.

The possibility that drive effects might be associated with the use of a negative feedback manipulation was discussed earlier in this thesis (chapter 8.1). Such a possibility was not seen as relevant to the use of negative feedback during experiment one as this experiment was designed to test between two different theories to account for the observed propensity of Type A individuals to resist being self-aware (discussed in much greater detail in chapters 6 and 8). Drive effects may clarify the difficulty with explaining why Type A subjects do not respond to the video manipulation of self-awareness after negative feedback when they must be aware of this previous poor performance in order to wish to avoid being self-aware. In chapter 8 (section 4) it was observed that Type A subjects who are unself-aware (alone) tend to respond quickly with little apparent concern for accuracy. When self-aware (video) after no feedback (experiment three trial 1) or after positive feedback (trial 2 of experiments one & three) Type A subjects appear to adopt an accuracy standard. This accuracy standard is not apparent in their performance after negative feedback in experiment one.

It may be, as suggested above, that this standard is given less priority by Type A subjects than the information that they have previously performed poorly on the task. Thus they may merely become self-aware of previous poor performance and then resist further self-awareness, thereby "short-cicuiting" the self-regulatory loop proposed by Carver and Scheier (1981). Such a process seems likely to involve motivational factors however. It is hard to imagine, given their apparent need to exert control (eg. Glass, 1977b), that these Type A subjects would not be motivated to try much harder by this awareness of previous poor performance.

Thus, even if their public standards which promote accuracy do become salient to these subjects when they are self-aware, their drive to perform more quickly (believing that previously they had performed too slowly) might easily negate this standard. Such a process has the potential to produce in Type A subjects who are self-aware much the same pattern of performance as shown by Type A subjects who are not self-aware. Another explanation which is more consistent with data reported here and elsewhere is plausible however.

This interpretation of the effects found in experiment one for Type A subjects who received negative feedback is based on the theorizing by Duval and Wicklund (1972) concerning objective and subjective self-awareness. Duval and Wicklund (1972) proposed that individuals are able to avoid objective self-awareness (OSA) by engaging in activity to provide alternative stimuli to those that might prompt OSA. Such a process might well also be associated with drive to reduce the discrepancy between the held standards and actual performance. Glass (1977b) proposed that one reason for the hyper-responsiveness of Type A individuals may be that it helped them to avoid dwelling on the possibility of failure.

Thus it appears that Type A subjects may have been motivated, by previous negative feedback, to avoid the state of OSA induced by the video manipulation in experiment one. This line of reasoning still presumes that Type A subjects must have been self-aware of their previous poor performance at intervals in order to be motivated to avoid that state. Given the brevity of the trial two of the task (12 minutes maximum) it may be possible that Type A subjects could completely avoid self-awareness for that length of time. Researchers in this field have been very vague about what frequency of self-awareness constitutes not self-aware and how often the individual must be enter a state of OSA (eg. Duval and Wicklund, 1972) or engage in a matching to standard (eg. Carver and Scheier, 1981) to be classed as "self-aware".

In the absence of evidence to the contrary, it is possible that Type A individuals engaged in self-focussing of attention upon receiving negative feedback about their performance before trial two of the task (the video manipulation was operating when this feedback was presented). It is likely that all Type A subjects would have found this previous performance unacceptable in terms of their performance standards, thus being motivate both to do better on trial 2 of the task and to avoid awareness of this previous poor performance. It is reasonable to presume that these subjects would experience high levels of drive due to the combination of these two motivations. All or most of these Type A subjects may then have managed to completely avoid being self-aware during trial two.

Some theorizing from the work of Duval and Wicklund (1972) may clarify a process by which these Type A subjects were able to avoid self-awareness during trial 2 of the task. Duval and Wicklund (1972) believe that individuals in the state of SSA continue to be aware of bodily sensations (see p.4) but that these sensations do not produce self-awareness (p.9). It therefore seems possible that Type A individuals who are subjectively self-aware may be aware of their extremely high activity and motivation levels. If Type A individuals regularly engage in hyper-responsivity to avoid self-awareness (Glass, 1977b) such a state may provide a continual cue that self-awareness is to be avoided. It must be stressed that this interpretation is speculative but that it also fits with theorizing about Type A behaviour and self-awareness. Although this line of reasoning employs the SSA/OSA distinction made by Duval and Wicklund (1972) which appears to have been largely discarded in later work by Wicklund (1975; 1978; 1979) and by Carver and Scheier (1981), it does not depend on the original theorizing that OSA would invariably be experienced as aversive (eg. Duval and Wicklund (1972). This part of the theory of OSA was later discounted by Wicklund (1975) and criticized by Carver and Scheier (1981).

The interpretations presented above are necessarily speculative. This is mainly due to the vagueness of a great deal of self-awareness theorizing. Before more concrete interpretations are possible, however, research to determine more exactly how self-awareness and the avoidance of that state are operationalized by the individual must be carried out. The data from experiment one may continue to be taken to support the notion that Type A individuals will resist being self-aware when that state is potentially aversive to them even if motivational factors are seen as mediating the effects reported in chapter 6.

It was previously suggested that Type A individuals may be aware of their standards after negative feedback, but drive effects may prevent these standards from affecting their performance. This seems to be the least acceptable of the interpretations presented above. It is very unlikely that drive effects would have negated the effects of awareness of performance standards to produce almost exactly the same pattern of performance data as observed for Type A subjects in the alone condition (see figs. 1 & 2 chapter 6). Either the "short-circuiting" of the self-regulatory loop theory (from Carver and Scheier, 1981) or the final interpretation based on drive effects and the Duval and Wicklund (1972) distinction between SSA and OSA seem to be the most plausible approaches. Both of these approaches rely on the premise that Type A individuals will resist being self-aware when the state of self-awareness is likely to be aversive to them. In this case the aversiveness of this state was due to these subjects believing that their previous performance had been poor.

If, as suggested here, Type A individuals do block out awareness of poor performance by increasing their level of effort (thus appearing to be even more extremely "Type A"), this has great ramifications for those attempting to modify the Type A pattern of behaviour.

10.4 <u>Self-awareness and Modification of Type A Behaviour</u>

A number of studies have been reported in which the attempt has been made to modify the Type A behaviour of subjects. The rationale behind these studies is that reduction of extreme Type A behaviours will lead to reduction of risk of CHD (eg. Rosenman and Friedman, 1977), although little empirical support for this notion has been reported. Most of the studies which have been reported have tended to adopt an over-simplified approach to the problem of modifying a complex and pervasive pattern of behaviour, according to Price (1982). Such studies have tended to be of very short duration (eg. 5 hours of stress management training by Suinn, 1975) and have generally focussed on stress reduction, while ignoring other aspects of the Type A pattern (eg. anxiety management training by Suinn and Bloom, 1978). Simply dealing with stress in these programs would appear to be dealing with a symptom of the Type A pattern rather than with a component of the pattern itself (eg. Thoresen, Telch and Eagleston, 1981).

In response to early evidence that Type A subjects may not be aware of their own behaviour pattern, Rosenman and Friedman (1977) proposed that self-awareness training should be an integral part of any attempt to change Type A behaviour. One of the best designed of the reported studies, run by Roskies, Kearney, Spevack, Surkis, <u>et al</u> (1979), indicated that Type A individuals may resist specific self-awareness training. These researchers compared the effectiveness of two forms of group therapy in modifying the Type A behaviour of 25 healthy men. They found that these therapies significantly reduced subjects' serum cholesterol and systolic blood pressure, and produced improvements in self-reported feelings of time pressure, family and work satisfaction after 14 weeks. At a six month follow-up the behaviour therapy group had lower levels of serum cholesterol than the psychodynamic therapy group. Whereas the behaviour therapy involved relaxation training techniques, in the psychodynamic group the attempt was made to train Type A individuals to increase their awareness of their own Type A pattern of behaviour.

The lack of long term effectiveness of the psychodynamic therapy tends to indicate that there may be problems in modifying Type A behaviour even when these individuals are given specific self-awareness training. It seems probable that, outside of the group situation, the threats and challenges faced by these Type A individuals in their daily lives quickly motivated them to avoid self-awareness. It is likely that their Type A pattern of behaviour actually facilitated this avoidance.

Although initially successful, this self-awareness training employed by Roskies _et al_ was obviously not successful in leading to long-term behaviour change, as measured by physiological indices. The data reported by clusions of this thesis, however, in indicating that self-awareness training may not be enough to modify Type A behaviour directly. From the findings reported here it is also evident that Type A subjects may need to be taught to deal with challenge and threat in a different way. A combination of relaxation training (which Roskies et al found to have a long term effect) and self-awareness training may serve to promote behaviour change in Type A individuals. The largest, best designed and most ambitious Type A behaviour change program to be attempted in this area of research has employed both of these elements.

The ongoing Recurrent Coronary Prevention Project (Friedman et al, 1982) was designed to assess the degree to which Type A behaviour is able to be modified in individuals who have survived myocardial infarction, and the degree to which this will modify their risk of a subsequent infarct. Approximately 300 subjects receive intensive medical information about CHD and about dealing with depression in fortnightly groups of 10-15 (control subjects). Another 600 (approximately) post-infarct subjects are taught about Type A behaviour and how to modify it, in addition to the intensive medical information. All groups met every week early in the program, followed by fortnightly meetings, finally to meet every month (after the first 6 months), for the remainder of the 5 year program.

This Type A behaviour change program is broadly based on a social learning theory approach to changing the total lifestyle of Type A individuals (described in detail in Friedman <u>et al</u>, 1982). Friedman <u>et al</u> (1982) believe that only a program of this scope, length and intensity has a chance of modifying Type A behaviour and CHD risk to a significant degree. They chose post-infarct patients, on the assumption that the life threatening event which these individuals had suffered would assist their motivation towards change.

This program concentrates specifically on promoting subjects' continued awareness of their Type A behaviour in supportive, non-threatening groups. Preliminary results of this program have been impressive, indicating that both the design and the long duration are necessary to change such an ingrained pattern of responding to challenge and threat. Given the conclusions of this thesis it is easy to imagine that short term threatening behaviour change programs might actually exacerbate the problem (Type A behaviour) by presenting it to Type A individuals as some failing in their character which has the potential to kill them. Such an awareness is likely to be so threatening to these individuals that they would tend to avoid it in their usual manner, by working harder.

It is not difficult to imagine that Type A individuals might actually attempt to apply their pattern of behaviour to their attempts to change it. Thus they may actually strive to reduce their achievement striving. It seems more likely that Type A individuals may tend to avoid awareness of their pattern of behaviour in much the same way as they appear to avoid other negative information about themselves; by their hyper-responsiveness (eg. Glass, 1977b). Even those with the best of intentions to modify their Type A behaviour may be forced back into this pattern by particularly stressful, threatening or challenging situations.

10.5 Tentative Findings and Areas for Future Research

In the preceding conclusions the results of the two questionnaire studies (reported in chapters 4 and 5) have not been mentioned. The low correlations found between measures of Type A behaviour and self-awareness were interpreted with great caution in chapter 5. The correlations were so low that they really only can be seen as indicating the existence of a promising area for future research. Against the previously reported literature these correlations indicated the existence of a weak positive relationship between Type A behaviour and self-awareness, rather than the expected negative relationship. Improved methods for measuring self-awareness are likely to clarify the nature of this relationship, especially if more specific instruments as opposed to the current global means are developed.

The questions appended to the interview in chapter 5 showed promise as specific measures of self-awareness relevant to Type A behaviour. These questions tended to indicate that Type A subjects were interested in awareness of their own performance. A great deal of development and validation is required, however, before such questions might be considered to be reliable. Such development is obviously beyond the scope of this thesis but it could be of great value in further clarifying the nature of the Type A behaviour pattern. The dimensions of self-awareness in which Type A individuals express most interest would seem very likely to elucidate further the nature of the standards which they hold for themselves.

Effects found in the data from subjects' attributions have not been discussed in the main part of this chapter due to the fact that they were discussed at some length in chapter 9 and because of the reservations held about them. The effects do offer some support for two main conclusions. The first of these is that it appears from the effects of the various social conditions on subjects' attributions and performance, that Type A individuals are generally more responsive to their social surroundings than their Type B counterparts. This finding does not support the contention of Dembroski and MacDougall (1978) that Type A subjects are particularly interested in social comparison information as such information was not available in the mirror (experiment two), the video (experiments one and three) or the attribution condition (experiment three). Rather it appears that differing performance standards become salient to Type A subjects in these conditions whereas

Type B subjects show little evidence of possessing such strong standards. Thus the data reported in this thesis indicate that Type A individuals are responsive to their social situation but that this responsivity is not just due to an interest in social comparison information. Of course Type A individuals may well be interested in social comparison information where it is available to them.

The second of these conclusions is that the process of answering attribution questionnaires has a strong drive-like effect on Type A subjects but not on Type B subjects. This is also a finding which needs further investigation to determine the exact cause of the marked effect of the attributional process on Type A subjects. It may just be a manifestation of Type A individuals' dislike for questionnaires, observed by Rosenman (1978). From their responses to this condition, however, it almost appears that Type A subjects react as though their attributions constitute a public statement of their intentions which they are extremely motivated (driven) to live up to. This is consistent with Gatoy's (1981) finding that Type A individuals who expect to be involved in a competitive situation will publicly report high expectations (or standards) for their performance.

The lack of previously reported experimental studies of the attributional style of Type A and B individuals rendered interpretation of the effects reported in chapter 9 extremely difficult. The effects were interpreted mainly in terms of the desire for control observed amongst Type A individuals. While there may be many other factors underlying the effects found for these attributions data, it was not reasonable to base extensive speculation upon data which were of doubtful validity and reliability (as discussed in chapter 7.4 and 9.9). Nevertheless, these effects in the data from subjects' attributions also offer a promising area for future investigation. Attributions present a possible method of elucidating the motivations and perceptions of their own behaviour of Type A and B individuals. Obviously the techniques employed in this research must be refined and developed.

10.6 The Importance of the Social Setting to Type A and B Individuals

The findings already discussed in this chapter have cast some light on aspects of the Type A pattern of behaviour which have been poorly understood and have indicated some directions for future research and practice. Perhaps the most important of these findings is that Type A individuals appear to resist self-awareness when this is likely to be aversive to them. The ramifications of this finding have been discussed at some length as they are important and far-reaching. There is another important finding from the research reported in this thesis which, although necessarily more tentative than the first, also has potential implication for an improved understanding of the Type A behaviour pattern.

It has become evident from the data reported here that Type A individuals are more responsive to their social situation, both in terms of their performance (behaviour) and attributions (cognitions), than their Type B counterparts. This is evident in the performance data effects for experiment three and in most data from subject's attributions. The effects found for subjects attributions concerning luck do not support this trend as strongly, however, and the uninterpretable effect for attributions concerning effort, offers no support at all. Thus this effect must be treated with caution. Never-the-less the weight of the evidence reported here indicates that Type A subjects are more responsive to their social situation than are Type B subjects.

The most plausible explanation for this effect comes from the contention of Friedman _et al_ (1981) that Type A behaviour develops out of insecurity and a need of these individuals to prove their worth to others. It is natural that those who desire to prove their worth should set high standards for themselves and that they should consider their social situation when setting these standards. For example, when alone Type A subjects performed quickly but inaccurately on the task (experiment one). Videotaped Type A subjects were, however, markedly more accurate in their performance. Therefore Type A subjects appear to recognise the importance of accuracy to others but do not seem to see it as very important themselves. Type B subjects were not as greatly affected by their social situation, perhaps due to the fact that they do not feel the need to prove themselves (eg. Friedman et al, 1981).

This finding has general implications for social research as many manipulations which are employed in self-awareness (eg. Duval and Wicklund, 1972) and social facilitation research (eg. Zajonc, 1965; Guerin and Innes, 1984) might be expected to affect Type A individuals more profoundly than Type B individuals. Thus experiments such as the one run by Davis and Brock (1975) which indicated that subjects resisted the effects of a video manipulation of self-awareness after negative feedback, may only have yielded such a result due to the presence of Type A individuals in the subject sample.

It is evident from the effects found in experiment three that the response of undifferentiated or "Type X" subjects to the social manipulations was similar to the response of Type B subjects. This effect might almost be seen as being associated with some threshold value in "Type A-ness" as it is only evident in relatively extreme Type A subjects. Thus this finding has implications for those interested in the assessment of Type A behaviour. If responsiveness to social situation is only reliably associated with extreme Type A behaviour, it may be used as a measure or as a reliability check for other measures of Type A behaviour.

The fact that Type A individuals appear to adopt different performance standards when alone than when they are in social situations also has implications for experiments using Type A subjects. Researchers should consider the possible effects on Type A subjects of their presence, and of the presence of other subjects, observers or recording equipment. It is evident from the data reported here that these social conditions may have a marked effect on the standards and performance strategies adopted by Type A individuals.

The hypothesis is strongly supported by most of the effects reported here and is consistent with recent theorising by others who are interested in the nature and antecedents of Type A behaviour. Given the fact, however, that the social manipulations did not invariably fail to affect Type B and Type X subjects, it appears that further research is necessary to provide conclusive proof that Type A individuals are more responsive to their social situation.

It has been proposed by Price (1982) that Type A behaviour can only be understood within the social setting in which it is manifested. A more recent theoretical paper goes so far as to suggest that Type A behaviour can better be understood by means of an ecological analysis which explains the Type A pattern of behaviour within its social and cultural milieu. Margolis, McLeroy, Runyan and Kaplan (1983) suggest that the development of a complete understanding of the Type A pattern of behaviour has been rendered extremely difficult by the researchers concentrating on this pattern at an individual level. They believe that understanding of the Type A pattern of behaviour can be facilitated by studying it at a social and cultural level.

In the light of the research reviewed and presented in this thesis it is evident that important aspects of the Type A pattern of behaviour may be socially and situationally determined. An analysis of the system relating the individual's Type A behaviours to the complex social setting within which those behaviours are displayed may provide an understanding with two main potential benefits. Firstly, such an understanding may help efforts to prevent the development of this pattern of behaviour in young people and, secondly, it must facilitate attempts at changing this pattern once it is established.

Thus studies at the individual level, such those as reported in this thesis, suggest that Type A behaviour is responsive to situational factors. The benefit of this knowledge is that it improves the probability of being able to successfully modify Type A behaviour. There is a potential paradox in this, however, as researchers have suggested that the social system in Western countries may actually encourage the Type A style of behaviour (eg. Price, 1982; Margolis, et al, 1983). The possibility then exists that individuals who recognise their own Type A behaviour may be put in, what is essentially, an untenable position. Achievement striving, punctuality and aggressiveness (Type A behavioural characteristics) are often seen as desirable traits, however, self-injurious behaviours are almost universally discouraged. Thus many individuals may be encouraged to display Type A characteristics and to ignore the possibly injurious consequences of such behaviour.

This potential paradox may be the chief problem to be dealt with by those who attempt to understand and modify Type A behaviour. Thus it appears necessary for researchers to approach this problem at two levels. A close investigation of Type A behaviour at a social level is required, to determine the nature of social reinforcers which encourage Type A behaviour. Research must also take place at an individual level, however, to determine specific social variables which elicit Type A behaviours and the ways in which these situations are dealt with by Type A persons. The integration and coordination of these two levels of research endeavour is likely to produce a clearer understanding of the contingencies which operate between social setting and Type A behaviour.

APPENDICES

APPENDICES

Following can be found appendix sections A through to J (inclusive), in alphabetical order.

CONTENTS: PAGE NO.

CONTENTS: PAGE NO.

CONTENTS: PAGE NO.

CONTENTS: PAGE NO.

CONTENTS: PAGE NO.

APPENDIX A: APPENDIX TO CHAPTERS 3 AND 4

A.1

THE JENKINS ACTIVITY SURVEY

Form T

Medical research is trying to track down the causes of several diseases which are attacking increasing numbers of people. This survey is part of that research effort.

Please answer the questions on the following pages by marking the answers that are true for you. Each person is different, so there are no "right" or "wrong" answers. Of course, all you tell us is strictly confidential-to be seen only by the research team. Do not ask anyone else about how to reply to items. It is your personal opinion that we want.

Your assistance will be greatly appreciated.

For each question mark the ONE best answer.

1. Do you ever have trouble finding time to get your hair cut or styled?
   - [] Never
   - [] Occasionally
   - [] Almost always

2. Does university "stir you into action"?
   - [] Less often than most university students
   - [] About average
   - [] More often than most university students

3. Is your everyday life filled mostly by
   - [] problems needing solution?
   - [] challenges needing to be met?
   - [] a rather predictable routine of events?
   - [] not enough things to keep me interested or busy?

4. Some people live a calm, predictable life. Others find themselves facing unexpected changes, frequent interruptions, inconveniences or "things going wrong". How often are you faced with these minor (or major) annoyances or frustrations?
   - [] several times a day
   - [] about once a day
   - [] a few times a week
   - [] once a week
   - [] once a month or less

For each of the following items , please mark the one best answer

5. When you are under pressure or stress, what do you usually do?
   [] do something about it imme diately
   [] plan carefully before taking any action

6. Ordinarily, how rapidly do you eat?
   [] I'm usually the first one finished
   [] I eat a little faster than average
   [] I eat about the same speed as most people
   [] I eat more slowly than most people

7. Has your spouse or a friend ever told you that you eat to fast?
   [] Yes, often
   [] Yes, once or twice
   [] No, never

8. How often do you find yourself doing more than one thing at a time, such as working while eating, reading while dressing, or figuring out problems while driving?
   [] I do two things at once whenever practical
   [] I do this rarely when I'm short of time
   [] I rarely or never do more than one thing at a time

9. When you listen to someone talking, and this person takes <u>too long</u> to come to the point, how often do you <u>feel</u> like hurrying the person along?
   [] frequently
   [] occasionally
   [] almost never

10. How often do you actually "put words" in the person's mouth in order to speed things up?
   [] frequently
   [] occasionally
   [] almost never

11. If you tell your spouse or a friend that you will meet somewhere at a definite time, how often do you arrive late?
   [] once in a while
   [] rarely
   [] I am never late

12. How often do you find yourself hurrying to get places when there is plenty of time?
   [] frequently
   [] occasionally
   [] almost never

For each of the following items , please mark the one best answer

13. Suppose you are to meet someone at a public place (street corner, building lobby, restaurant) and the other person is already 10 minutes late. What will you do?

[] sit and wait

[] walk about while waiting

[] usually carry some reading matter or writing paper so I can get something done while waiting

14. When you have to "wait in line" at a restaurant, a store, or the post office, what do you do?

[] accept it calmly

[] feel impatient but not show it

[] feel so impatient that someone watching can tell I am restless

[] refuse to wait in line and find ways to avoid such delays

15. When you play games with young children about 10 years old, how often do you purposely let them win?

[] most of the time

[] half of the time

[] only occasionally

[] never

16. Do most people consider you to be

[] definitely hard-driving and competitive?

[] probably hard-driving and competitive?

[] probably more relaxed and easy going?

[] definitely more relaxed and easy going?

17. Nowadays, do you consider yourself to be

[] definitely hard-driving and competitive?

[] probably hard-driving and competitive?

[] probably more relaxed and easy going?

[] definitely more relaxed and easy going?

18. Would your spouse (or closest friend), rate you as

[] definitely hard-driving and competitive?

[] probably hard-driving and competitive?

[] probably more relaxed and easy going?

[] definitely more relaxed and easy going?

19. Would your spouse (or closest friend) rate your general level of activity as

[] too slow-should be more active?

[] about average-busy much of the time?

[] too active-should slow down?

For each of the following items, please mark the one best answer

20. Would people who know you well agree that you take your work too seriously?
[] definitely yes
[] probably yes
[] probably no
[] definitely no

21. Would people who know you well agree that you have less energy than most people?
[] definitely yes
[] probably yes
[] probably no
[] definitely no

22. Would people who know you well agree that you tend to get irritated easily?
[] definitely yes
[] probably yes
[] probably no
[] definitely no

23. Would people who know you well agree that you tend to do most things in a hurry?
[] definitely yes
[] probably yes
[] probably no
[] definitely no

24. Would people who know you well agree that you enjoy a contest and try too hard to win ?
[] definitely yes
[] probably yes
[] probably no
[] definitely no

25. Would people who know you well agree that you get alot of fun out of your life?
[] definitely yes
[] probably yes
[] probably no
[] definitely no

26. How was your temper when you were younger?
[] fiery and hard to control
[] strong but controllable
[] no problem
[] I almost never got angry

For each of the following items , please mark the one best answer

27. How is your temper nowadays?
- [] fiery and hard to control
- [] strong but controllable
- [] no problem
- [] I almost never got angry

28. When you are in the midst of studying and someone interrupts you, how do you feel inside?
- [] I feel OK because I work better after an occasional break
- [] I feel only mildly annoyed
- [] I feel really irritated because most such interuptions are unnecessary

29. How often are there deadlines on your courses (If deadlines occur irregularly, please circle the closest answer below)
- [] daily or more often
- [] weekly
- [] monthly or less often
- [] never

30. These deadlines usually carry
- [] minor pressure because of their routine nature
- [] carry considerable pressure, since delay would upset things a great deal

31. Do you ever set deadlines or quotas for yourself in courses or other things?
- [] no
- [] yes, but only occasionally
- [] yes, once a week or more

32. When you have to work against a deadline, what is the quality of your work?
- [] better
- [] worse
- [] the same (pressure makes no difference)

33. In your work, do you ever keep two jobs moving forward at the same time by shifting back and forth rapidly from one to the other?
- [] no, never
- [] yes, but only in emergencies
- [] yes, regularly

34. Do you maintain a regular study schedule during vacations such as Christmas and Easter?
- [] yes
- [] no,
- [] sometimes

For each of the following items , please mark the one best answer

35. How often do you bring work home with you at night, or study materials related to your courses?
[] rarely or never
[] once a week or less
[] more than once a week

36. How often do you go to the university when it is officially closed (such as nights or weekends)? If this is not possible mark here: 0
[] rarely or never
[] occasionally (less than once a week)
[] once a week or more

37. When you find yourself getting tired while studying, do you usually?
[] slow down for a while until my strength comes back
[] keep pushing myself at the same pace in spite of tiredness

38. When you are in a group, how often do the other people look to you for leadership?
[] rarely
[] about as often as they look to others
[] more often than they look to others

39. How often do you make yourself written lists to help you to remember what needs to be done?
[] never
[] occasionally
[] frequently

For questions 42-46, compare yourself with the average student at your university.

40. In amount of effort put forth, I give
[] much more effort
[] a little more effort
[] a little less effort
[] much less effort

41. In sense of responsibility, I am
[] much more responsible
[] a little more responsible
[] a little less responsible
[] much less responsible

42. I find it necessary to hurry
[] much more of the time
[] a little more of the time
[] a little less of the time
[] much less of the time

For each of the following items , please mark the one best answer

43. In being precise (careful about detail), I am
   [] much more precise
   [] a little more precise
   [] a little less precise
   [] much less precise

44. I approach life in general
   [] much more seriously
   [] a little more seriously
   [] a little less seriously
   [] much less seriously

A.2: JAS-Computer Scored Form (see Footnote)

This survey was primarily designed for middle-aged, working populations, so for those who have not at one stage had continuous full time employment for a period of at least 12 months please answer work-related questions by treating your studies as your employment.

Jenkins Activity Survey

For each question mark the best answer. Mark only one answer for each question.

1. Do you ever have trouble finding time to get your hair cut or styled?
   - [] Never
   - [] Occasionally
   - [] Almost always

2. How often does your job "stir you into action"?
   - [] Less often than most people's jobs
   - [] About average
   - [] More often than most people's jobs

3. Is your everyday life filled mostly by
   - [] problems needing solution?
   - [] challenges needing to be met?
   - [] a rather predictable routine of events?
   - [] not enough things to keep me interested or busy?

4. Some people live a calm, predictable life. Others find themselves facing unexpected changes, frequent interruptions, inconveniences or "things going wrong". How often are you faced with these minor (or major) annoyances or frustrations?
   - [] several times a day
   - [] about once a day
   - [] a few times a week
   - [] once a week
   - [] once a month or less

5. When you are under pressure or stress, what do you usually do?
   - [] do something about it immediately
   - [] plan carefully before taking any action

Footnote: Only the title page of this scale, showing instructions used for university students, is reproduced here due to copyright restrictions.

A.3: Bortner Type A Scale (short form)

Below is a set of descriptive extremes. Please indicate by circling on of the numbers, where you think you belong between each pair of extremes.

1. Never late	1	2	3	4	5	6	Casual about appointments
2. Not competative	1	2	3	4	5	6	Very competitive
3. Always rushed	1	2	3	4	5	6	Never feels rushed even under pressure
4. Takes things one at a time	1	2	3	4	5	6	Tries to do many things at once
5. Fast (eating walking etc.)	1	2	3	4	5	6	Slow doing things
6. "Sits" on feelings	1	2	3	4	5	6	Expresses feelings
7. Many interests	1	2	3	4	5	6	Few interests outside work

A.4: Self-consciousness Scale

Here are a set of 23 statements describing feelings which you may have about yourself. Please indicate the degree (on the scale 1 to 5) to which you believe each statement is true (or characteristic) of you.

Statements	Not at all true of me				Very true of me
I'm always trying to figure myself out	1	2	3	4	5
I'm concerned about my style of doing things .	1	2	3	4	5
Generally, I'm not very aware of myself . . .	1	2	3	4	5
It takes me time to overcome my shyness in new situations . .	1	2	3	4	5
I reflect about myself alot . . .	1	2	3	4	5
I'm concerned about the way I present myself . .	1	2	3	4	5
I'm often the subject of my own fantasies . .	1	2	3	4	5
I have trouble working when someone is watching me . . .	1	2	3	4	5
I never scrutinize myself	1	2	3	4	5
I get embarrassed very easily . .	1	2	3	4	5
I'm self-conscious about the way I look . . .	1	2	3	4	5
I don't find it hard to talk to strangers . .	1	2	3	4	5
I'm generally attentive to my inner feelings .	1	2	3	4	5
I usually worry about making a good impression .	1	2	3	4	5

I'm constantly examining my motives	1	2	3	4	5
I feel anxious when I speak in front of a group .	1	2	3	4	5
One of the last things I do before I leave my house is look in a mirror	1	2	3	4	5
I some times have the feeling that I'm off somewhere watching myself	1	2	3	4	5
I'm concerned about what other people think of me . . .	1	2	3	4	5
I'm alert to changes in my mood. .	1	2	3	4	5
I'm usually aware of my appearance	1	2	3	4	5
I'm aware of the way my mind works when I work through a problem	1	2	3	4	5
Large groups make me nervous . . .	1	2	3	4	5

A.5: Snyder Self-monitoring (of Expressive Behaviour) Scale

Personal Reaction Inventory

The statements on the following pages concern your personal reactions to a number of different situations. No two statements are exactly alike, so consider each statement carefully before answering. If a statement is TRUE or MOSTLY TRUE as applied to you, circle the T beside the item. If a statement is FALSE or NOT USUALLY TRUE as applied to you, circle the F beside the item.

It is important that you answer as frankly and honestly as you can. Your answers will be kept in the strictest confidence.

1. I find it hard to imitate the behavior of other people.	T	F
2. My behavior is usually an expression of my true inner feelings.	T	F
3. At parties and social gatherings, I do not attempt to do or say things that others will like.	T	F
4. I can only argue for ideas which I already believe.	T	F
5. I can make impromptu speeches even on topics about which I have almost no information.	T	F
6. I guess I put on a show to impress or entertain people.	T	F
7. When I am uncertain how to act in a social situation, I look to the behavior of others for clues.	T	F
8. I would probably make a good actor	T	F
9. I rarely need the advice of my friends to choose movies, books or music.	T	F
10. I sometimes appear to others to be experiencing deeper emotions than I actually am.	T	F

11. I laugh more when I watch a comedy with others than when alone.	T	F
12. In a group of people I am rarely the centre of attention	T	F
13. In different situations and with different people, I often act like very different persons.	T	F
14. I am not particularly good at making other people like me.	T	F
15. Even if I am not enjoying myself, I often pretend to be having a good time.	T	F
16. I'm not always the person I appear to be.	T	F
17. I would not change my opinions (or the way I do things) in order to please someone or win their favour.	T	F
18. I have considered being an entertainer.	T	F
19. In order to get along and be liked, I tend to be what people expect me to be rather than anything else.	T	F
20. I have never been good at games like charades or improvisional acting.	T	F
21. I have trouble changing my behavior to suit different people and different situations.	T	F
22. At a party I let others keep the jokes and stories going.	T	F
23. I feel a bit awkward in company and do not show up quite so well as I should.	T	F
24. I can look anyone in the eye and tell a lie with a straight face (if for a right end).	T	F
25. I may deceive people by being friendly when I really dislike them.	T	F

A.6: Cutick's Self-esteem Scale

Answer the following questions by placing a check mark on, or by drawing a single line through the scale at any point.

1. When doing things that interest you most, in what % of such cases are you fully satisfied with your performance?

|____|
0 50 100

2. When you participate in group activities that call for decisions to be made, in what % of such cases do your ideas and opinions influence the group decision?

|____|
0 50 100

3. When a situation demands that you take initiative and act independently, in what % of such cases can you fuction effectively and efficiently on your own.

|____|
0 50 100

4. When meeting new people for the first time in social, business or academic settings, in what % of such cases are you able to impress them favourably and form good relations?

|____|
0 50 100

5. When others trust and depend on you to carry out a certain job for them, in what % of such cases do you behave dependably?

|____|
0 50 100

6. When sound judgement is needed about appropriate actions to be taken in special situations, in what % of such cases do you make sound judgements?

0	50	100

7. When you face new situations which require rapid and accurate problem solving ability, in what % of such cases are your solutions rapid and accurate.

0	50	100

8. When you try to reach important goals of any kind and to succeed generally in your everyday activities, in what % of such cases do you attain your goals and function consistently with satisfactory results?

0	50	100

APPENDIX B: APPENDIX TO CHAPTER 5

B.1: Vicker's Type A Scale

Here are 9 self-description questions. Any answer which describes the way you feel or act is the right one to give. Circle one number per item. Remember that you may use any of the 7 response categories.

Answer quickly rather than making a long decision on each question. Ofcourse, if you want to think out an answer, feel free to do so. However, its your first impressions which are most important.

	very true of me		neither very true nor very untrue of me			not at all true of me	
1. I hate giving up before absolutely sure that I'm beaten.	1	2	3	4	5	6	7
2. Some times I feel that I shouldn't be working so hard, but something drives me on.	1	2	3	4	5	6	7
3. I thrive on challenging situations, the more challenges I have, the better.	1	2	3	4	5	6	7
4. In comparison to most people I know, I'm very involved in my work.	1	2	3	4	5	6	7
5. It seems as if I need thirty hours a day to finish all the things I'm faced with.	1	2	3	4	5	6	7
6. In general, I approach work more seriously than most people do.	1	2	3	4	5	6	7
7. I guess there are some people who can be casual about their work, but I'm not one of them.	1	2	3	4	5	6	7
8. My acheivements are considered to be significantly higher than those of most people I know.	1	2	3	4	5	6	7
9. I've often been asked to be an officer of some group or groups.	1	2	3	4	5	6	7

B.2: Snyder Self-monitoring Scale (rating-scale form)

Personal Reaction Inventory

The statements on the following pages concern your personal reactions to a number of different situations. No two statements are exactly alike, so consider each statement carefully before answering. Please circle the number which indicates how true each statement is for you.

It is important that you answer as frankly and honestly as you can. Your answers will be kept in the strictest confidence.

Statements	not at all true of me				very true of me
1. I find it hard to imitate the behavior of other people.	1	2	3	4	5
2. My behavior is usually an expression of my true inner feelings.	1	2	3	4	5
3. At parties and social gatherings, I do not attempt to do or say things that others will like.	1	2	3	4	5
4. I can only argue for ideas which I already believe.	1	2	3	4	5
5. I can make impromptu speeches even on topics about which I have almost no information.	1	2	3	4	5
6. I guess I put on a show to impress or entertain people.	1	2	3	4	5
7. When I am uncertain how to act in a social situation, I look to the behavior of others for clues.	1	2	3	4	5
8. I would probably make a good actor.	1	2	3	4	5

9. I rarely need the advice of my friends to choose movies, books or music.	1	2	3	4	5
10. I sometimes appear to others to be experiencing deeper emotions than I actually am.	1	2	3	4	5
11. I laugh more when I watch a comedy with others than when alone.	1	2	3	4	5
12. In a group of people I am rarely the centre of attention	1	2	3	4	5
13. In different situations and with different people, I often act like very different persons.	1	2	3	4	5
14. I am not particularly good at making other people like me.	1	2	3	4	5
15. Even if I am not enjoying myself, I often pretend to be having a good time.	1	2	3	4	5
16. I'm not always the person I appear to be.	1	2	3	4	5
17. I would not change my opinions (or the way I do things) in order to please someone or win their favour.	1	2	3	4	5
18. I have considered being an entertainer.	1	2	3	4	5
19. In order to get along and be liked, I tend to be what people expect me to be rather than anything else.	1	2	3	4	5
20. I have never been good at games like charades or improvisional acting.	1	2	3	4	5

21. I have trouble changing my behavior to suit different people and different situations.	1	2	3	4	5
22. At a party I let others keep the jokes and stories going.	1	2	3	4	5
23. I feel a bit awkward in company and do not show up quite so well as I should.	1	2	3	4	5
24. I can look anyone in the eye and tell a lie with a straight face (if for a right end).	1	2	3	4	5
25. I may deceive people by being friendly when I really dislike them.	1	2	3	4	5

B.3: Structured Interview

Interview Questions

1. Do you think that you are a hard-driving, no-nonsense sort of achiever or do you believe that you tend to do things in a rather leisurely manner?

2. Has your wife (husband, or a good friend) ever told you to take things easier or to slow down? How did she put it? Does she still have to tell you to slow down?

3. When you get angry or upset do people around you usually know it? How do you show it? Do you ever pound on your desk? Slam a door? Throw things?

4. Do you drive harder to accomplish things than most of the people you associate with?

5. Do you admire and have as much respect and faith in Doctors as your mother and father probably had?

6. Do you walk fast? Eat fast? After you have finished eating, do you like to sit and dawdle at the table or do you like to leave and get on with something else?

7. If there are 8 to 10 people ahead of you waiting to eat at a restaurant, would you wait? At a movie theatre? At the bank?

8. Alot of people when they have a cold, like to take their temperature to see if they have a fever. If they dont have a fever, they begin to feel better. Now in your case, when you have a cold, do you also,.....also usually ...uh ...uh ...uh ..take uh ...uh ...your temperature?

9. When you are in the bathroom do you sometimes like to do two things at once, such as reading a study journal or textbook, or brushing your teeth in the shower.

10. Most people usually get out of bed by about 8.30 am during the week although they may sleep in longer on the weekend. Now in your case, during the week, ...uh ...uh ...uh ... at what time do you ...uh ... uh ... uh ... get out of bed?

11. If you tell someone that you will be somewhere at 2.00 pm, will you be there?

12. What do you do if the car ahead of you in your lane is going too slowly? Have you ever sworn at such drivers? Has your wife ever told you to "cool it"?

13. Do you frequently find yourself both listening to someone and also thinking about another subject? Has your wife ever caught you doing this?

14. What sort of events, activities, or actions tend to irritate you? (ZOOM CAMERA)

15. In the past most people tended to use colgate toothpaste. More recently many have changed to brands like aquafresh because they prefer the taste. Now in your case do you prefer to use ... uh ... uh ... uh ... colgate ... uh ... uh ... uh ... or aquafresh toothpaste?

16. Do you ever play games (such as draughts or checkers) with children? Do you always let them win? When you play a game with contemporaries, do you play to win or do you play forthe fun of it?

17. Do you frequently just daydream? What do you dream about? Why not?

18. Do you sometimes find tha you like to time how long it takes you to do certain things like jogging, walking, bus trips, etc.?

19. How do you feel about waiting in lines? Bank lines, supermarket lines, post office lines? How long would you wait? What do you do while waiting? Are you frustrated while waiting?

20. What would you do if you and your wife were at a good restaurant and smoke from a man smoking a cigar at a nearby table was upsetting her? Suppose there was no other table? Suppose he said "drop dead"?

21. Suppose you were driving at 80 miles an hour on a busy highway to get your sick wife to the hospital. Suddenly you spot a police car in your rear view mirror with the policeman signalling you to pull off the highway? Suppose the cop says "I dont care what the emergency is, you were driving dangerously! Now let me see your licence"?

22. All of us have insecurities about certain things. What are your insecurities about?

B.4: Interview Scoring Form

Name:..................... Age:... Sex:...
Occupation:.........

		T	H

Content

		T	H
D01 Self-awareness Type A	25	_	
D05 Spouse says slow down	20	_	
D03 Walks fast, eats fast, no dawdle	20	_	
D02 Polyphasic, bath, TV, conversations	20	_	
D04 Fetish of being on time	20	_	
HC1 Irritable waiting, restaurant, bank, traffic	20		_
D07 Substitutes numerals for metaphors	20	_	
HM6 Use of obscenity	20		_
D06 Difficulty doing nothing	10	_	

Behaviour, Motor

		T	H
M01 Facial tautness expressing tension	20	_	
HM1 Hostile facial set	25		_
M12 Tense posture	15	_	
M15 Fast and jerky movements	20	_	
M13 Motorization/gestures accompanying responses	15	_	
M04 Repetitive hand, arm, leg movements	20	_	
HM4 Over-forceful gestures ie. clenched fist	25		_
HM2 Tic-like drawing back of lips	25		_
M07 Tic-like eyebrow lifting	15	_	
M03 Rapid eye blinking (>40/min.)	20	_	
M14 Expiratory sighing	20	_	
M06 Tongue to teeth clicking (involuntary)	15	_	
M08 Head nodding	10	_	

Behaviour, Speech

		T	H
M11 Speech hurrying, head nodding when listening	25	_	
B01,B02,B03 Interrupts interviewer	10,10,10	_	
M05 Rapid spch, dysrythmic, elision final words	20	_	
M09 Sucking air during speech	25	_	
HM3 Hostile, jarring laugh	25		_
HM5 Unpleasant voice; explosive, staccato, loud	25		_

Behaviour, Hostile/Competitive Attitudes

HB1 Interviewer challenge; hostile response	15	_
HB2 Angry generalizations (race, women, doctors)	15	_
HC2 General distrust of others motives	15	_
HC3 Competition with children/other adults	20	_
HM7 Exhibits anger at past event	25	_

Physiological Indicators

TC1 Periorbital pigmentation	25	_
TC2 Excessive forehead, upper lip perspiration	35	_
Totals		

APPENDIX C: APPENDIX TO CHAPTER 6

C.1

Table 1: Anagrams, solutions ordering formulae and word frequencies.

Word	Anagram	Ordering Formula	Word Frequency *
TRIAL ONE			
WATER	ERWAT	45123-E	442
TRAIN	TIRNA	14253-H	82
MUSIC	IUCMS	42513-H	216
VOICE	OICEV	23451-E	226
BEACH	BEAHC	12354-E	61
FAULT	TALFU	52413-H	22
CLERK	ECRLK	31425-H	34
HABIT	THABI	51234-E	23
GROIN	OINGR	34512-E	4
COBRA ** (CAROB)	OABCR	25314-H	3 (1)
ROACH	COHRA	42513-H	2
PATIO	PATOI	12354-E	2

Table 1 continued

Word	Anagram	Ordering Formula	Word Frequency *
TRIAL TWO			
HOUSE	EHOUS	51234-E	591
DRINK	DNRKI	14253-H	82
GUIDE	IGDUE	31425-H	36
VALUE	LUEVA	34512-E	200
FLOUR ** (FLUOR)	LOURF	23451-E	18 (<1)
GIANT	TINGA	52413-H	23
CLOTH	LHOCT	25314-H	43
MODEL	ELMOD	45123-E	77
TANGO	OTANG	51234-E	2
AUDIT	IUTAD	42513-H	4
BATON	BOANT	14253-H	10
JAUNT ** (JUNTA)	UNTJA	34512-E	2 (3)

* Indicates the frequency with which the word appeared in a 1.014 million word compilation.

** Indicates anagrams which were found not to be uniquely soluble. The frequency of the alternative solution is supplied.

C.2

Table 2: Mean squares, F ratios and significance levels for analyses of trial one performance data

	Lat. for Correct Resps.	Number Correct	Number of Errors
Main Effects	(2), 4.6 - -	(2), 6.5 - -	(2), 98.1 - -
Type	(1), 5.8 - -	(1), 4.9 - -	(1), 63.7 - -
Condition	(1), 3.1 - -	(1), 7.7 - -	(1), 125.8 - -
Interaction	(1), 1.9 - -	(3), 14.2 F=3.4, p=0.071	(1), 75.8 - -
Explained	(3), 3.7 - -	(3), 9.1 - -	(3), 90.7 - -
Residual	(56), 30.4	(56), 4.2	(56), 70.6
Total	(59), 29.0	(59), 4.4	(59), 71.6

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

C.3

Table 3: Mean squares, F ratios and significance levels for analyses of trial two performance data

	Lat. for Correct Resps.	Number Correct	Number of Errors
Main Effects	(3), 146.5 – –	(3), 48.4 – –	(3), 0.13 – –
Type	(1), 34.5 – –	(1), 56.1 – –	(1), 0.04 – –
Condition	(1), 304.1 F=3.3, p=0.076	(1), 49.2 – –	(1), 0.001 – –
Feedback	(1), 94.3 – –	(1), 45.3 – –	(1), 0.36 – –
2-way Interactions	(3), 23.5 – –	(3), 40.1 – –	(3), 1.8 – –
Type X Cond.	(1), 45.1 – –	(1), 27.1 – –	(1), 1.6 – –
Type X Fbk	(1), 8.2 – –	(1), 42.6 – –	(1), 0.02 – –
Cond X Fbk	(1), 20.8 – –	(1), 58.7 – –	(1), 3.2 – –
3-way Interaction	(1), 296.0 F=3.2, p=0.080	(1), 54.5 – –	(1), 12.7 F=7.2, p=0.009
Explained	(7), 115.1 – –	(7), 44.8 – –	(7), 2.7 – –
Residual	(52), 92.6	(52), 43.2	(52), 1.7
Total	(59), 95.3	(59), 43.4	(59), 1.9

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

C.4

Table 4: Means, standard deviations and subject numbers for 3-way interaction of untransformed latencies for correct responses made during trial two by Type, Condition and Feedback

	Positive Feedback Alone	Positive Feedback Video	Negative Feedback Alone	Negative Feedback Video
Type A	$\bar{X}$=9.95 SD=4.6 n=6	$\bar{X}$=23.1 SD=27.2 n=6	$\bar{X}$=12.3 SD=5.2 n=9	$\bar{X}$=13.4 SD=5.4 n=7
Type B	$\bar{X}$=14.1 SD=4.3 n=8	$\bar{X}$=14.3 SD=4.54 n=9	$\bar{X}$=9.32 SD=4.1 n=8	$\bar{X}$=15.5 SD=6.04 n=7

C.5

Table 5: Mean squares, F ratios and significance levels for analyses of natural logarithm transformed latencies for correct responses made during trial two.

	Natural Logarithms of Latencies for Correct Responses
Main Effects	(3), 0.497 - -
Type	(1), 0.0 - -
Condition	(1), 1.3 F=5.7, p=0.021
Feedback	(1), 0.1 - -
2-way Interactions	(3), 0.1 - -
Type X Cond.	(1), 0.0 - -
Type X Fbk	(1), 0.2 - -
Cond X Fbk	(1), 0.0 - -
3-way Interaction	(1), 1.0 F=4.3, p=0.042
Explained	(7), 0.4 - -
Residual	(52), 0.2
Total	(59), 0.3

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

APPENDIX D: APPENDIX TO CHAPTER 7

D.1

Table 1: Mean squares, F ratios and significance levels for analyses of trial one performance data

	Lat. for Correct Resps.	Number Correct	Number of Errors
<u>Main Effects</u>	(3), 0.06 - -	(3), 7.2 F=3.1, p=0.03	(3), 1.3 - -
Type	(1), 0.09 - -	(1), 1.9 - -	(1), 0.92 - -
Condition	(2), 0.04 - -	(2), 9.9 F=4.3, p=0.017	(2), 1.5 - -
<u>Interaction</u>	(2), 0.74 - -	(2), 1.1 - -	(2), 1.7 - -
Explained	(5), 0.03 - -	(5), 5.4 F=2.3, p=0.05	(5), 1.4 - -
Residual	(92), 0.32	(92), 2.3	(92), 0.85
Total	(97), 0.32	(97), 2.5	(97), 0.88

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

D.2

Table 2: Mean squares, F ratios and significance levels for analyses of trial two performance data

	Lat. for Correct Resps.	Number Correct	Number of Errors
<u>Main Effects</u>	(5), 0.09 - -	(5), 1.92 - -	(5), 4.29 F=2.4, p=0.044
Type	(1), 0.19 - -	(1), 1.23 - -	(1), 0.27 - -
Condition	(2), 0.06 - -	(2), 3.55 - -	(2), 3.38 - -
Feedback	(2), 0.09 - -	(2), 0.51 - -	(2), 7.08 F=3.96, p=0.023
<u>2-way Interactions</u>	(8), 0.21 - -	(8), 1.39 - -	(8), 0.98 - -
Type X Cond.	(2), 0.32 - -	(2), 1.26 - -	(2), 2.57 - -
Type X Fbk	(2), 0.20 - -	(2), 0.29 - -	(2), 0.23 - -
Cond X Fbk	(4), 0.18 - -	(4), 2.05 - -	(4), 2.08 - -
<u>3-way Interaction</u>	(4), 0.42 - -	(4), 1.19 - -	(4), 0.52 - -
Explained	(17), 0.22 - -	(17), 1.50 - -	(17), 2.21 - -
Residual	(80), 0.24	(80), 2.56	(80), 1.79
Total	(97), 0.24	(97), 2.33	(97), 1.86

Note: Only significance levels (and F-ratios) $p<0.1$ are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

APPENDIX E

Brief report of an experiment to test the hypothesis that the process of making attributions about factors affecting their performance cancels out the effects on subjects of manipulations of their social condition.

E.1 Introduction

An experiment was run to test the hypothesis that the process of making attributions will cancel out the effects of a social manipulation. This experiment employed a different task to the anagram task used in experiments 1 and 2 (chapters 6 and 7). This task (see method section) seemed to have the potential to be more engaging to subjects than the anagram task. As it was run in three sections or trials, this task presented more opportunity to have subjects answer attributions questionnaires during the experiment (between trials).

E.2 Method

E.2.1 Subjects and Procedure

Forty-two undergraduate psychology student subjects were approached by telephone to take part in this experiment (in the same fashion as in experiments 1 and 2). These subjects worked on an arithmetic task which was presented by computer, while either alone or with an observer present (the observer was in the same position relative to the subject as the observer in experiment 2). Half of these subjects made attributions about factors affecting their performance after each of the 3 trials of the task, the other subjects only made attributions after completing the task (subjects were assigned to these conditions by toss of coin).

E.2.2 <u>Experimental</u> <u>Task</u>

The task (designed by Christina Lee of the Department of Psychology, University of Adelaide) consisted of <u>easy</u>, <u>moderately difficult</u> and <u>difficult</u> sections. Using section 1 as an example, numbers were assigned to days of the week (eg. Monday=1, Tuesday=2, etc.). and subjects were required to add together days to yield an answer, also given as a day of the week. In section 2 subjects were required to add months of the year and in section 3, letters of the alphabet. Subjects were not able to use pencil and paper to facilitate their performance on the task. Subjects were given 2 minutes to solve each item, after which time the computer presented the next item. Timing and scoring was carried out by computer. Details of the task are presented below in table 1.

E.2.3 <u>Experimental</u> <u>Design</u>

This experiment presents a 2 (social condition: alone/observer) by 2 (attributions: during task/after task) by 2 (Type A/B) fully crossed, factorial design. Subject Type was designated by a median split on JAS Type A scale score (Jenkins, 1979) within each cell of the design a procedure which has been used widely (eg. Glass, 1977b). Exactly the same attributions questionnaire was used as was employed after experiment 2. A copy of this questionnaire is included in appendix J.2.

Table 1: Performance task items

Section 1 (days of the week)

1. Monday + Wednesday = (Thu)
2. Thursday + Monday = (Sat)
3. Friday + Tuesday = (Sun)
4. Saturday + Thursday = (Wed)
5. Wednesday + Friday = (Mon)

Section 2 (months of the year)

1. April + June = (Oct)
2. July + February = (Sep)
3. March + September = (Dec)
4. August + October = (Jun)
5. November + May = (Mon)

Section 3 (letters of the alphabet)

1. C + F = (I)
2. P + B = (R)
3. M + G = (T)
4. O + Q = (F)
5. V + K = (G)

E.3 <u>Results</u>

All performance and attributions data were analysed using the SPSS Anova procedure (Nie et al, 1970) with Type (A/B), Social Condition (alone/observer) and Attributions (during/after) as independent variables. A significant 3-way interaction effect was found for subjects ratings of the importance of amount of ability as a factor affecting their performance on the task ($F=5.22$, $df=1,41$, $p=0.029$). Details of this analysis are presented in table 2 and means, standard deviations and cell numbers are presented in table 3. The effect is graphed in figure 1.

Table 2: Degrees of freedom, mean squares, F-ratios and significance levels for the 3-way interaction effect of Type, Social Condition and Attributions on subjects' ratings of importance of amount of ability.

	df	MS	F-ratio	p
Type (T)	1	15.0	3.11	0.087
Observer (O)	1	0.15	0.03	0.857
Attribution (A)	1	12.8	2.66	0.112
T X O	1	11.9	2.47	0.125
T X A	1	8.14	1.70	0.202
O X A	1	1.96	0.40	0.527
T X O X A	1	25.07	5.22	0.029
Total	41	5.77		

Table 3; Means, standard deviations and subjects numbers for ratings of importance of amount of ability.

	Type A		Type B	
	Alone	Observer	Alone	Observer
Att.	$\bar{X}$=7.80	$\bar{X}$=8.00	$\bar{X}$=6.17	$\bar{X}$=5.40
	SD=0.84	SD=1.00	SD=1.84	SD=3.91
	n=5	n=5	n=6	n=5
No Att.	$\bar{X}$=6.83	$\bar{X}$=4.80	$\bar{X}$=4.00	$\bar{X}$=7.20
	SD=1.60	SD=1.80	SD=3.46	SD=1.10
	n=6	n=5	n=5	n=5

E.4 Discussion

The post-task attributions made by Type A and B subjects who only made attributions after the task were differentially affected by the alone versus observed manipulation. The post-task attributions made by Type A and B subjects who had made attributions during the task were not differentially affected by the social condition. Thus the hypothesis that process of making attributons tends to cancel out the effects on subjects of their social condition finds some support in these data. The lack of effects in the the performance data may indicate that this task is not as useful for investigating the effect of social condition on Type A and B subjects as the original anagram task (this is discussed in chapter 8).

APPENDIX F

Brief report of an experiment to assess the utility of monetary incentive as an alternative manipulation to false feedback about previous performance.

F.1 Introduction

This experiment was run chiefly in response to a study by Blumenthal *et al* (1980). Blumenthal *et al* had Type A and B subjects perform on a word guessing task in either a monetary incentive, an evaluative threat or a no incentive (control) condition. They found that Type A and B subjects manifested similar response patterns in the no incentive and evaluative threat conditions but that Type A subjects made significantly more solution attempts than Type B subjects in the monetary incentive condition. They concluded that Type A individuals are not only motivated by a need to maintain control (eg. Glass, 1977) but also respond strongly to the potential for reward.

This study seemed relevant to the present research as similarities between a monetary incentive and positive feedback appeared to exist. Both of these manipulations produced marked performance differences between Type A and B subjects in observed conditions (Blumenthal *et al* had the experimenter present, running the task in their experiment). The small study reported here was run shortly after experiment two using subjects who had taken part in that previous experiment.

F.2 Method

F.2.1 Subjects and Procedure

Thirty-two subjects (16 Type A and 16 Type B) who had taken part in experiment 2 were approached by telephone (in the same fashion as for experiments 1 and 2). Subjects worked at the same mental arithmetic task as was employed in the attributions experiment mentioned in chapter 7 and descibed in appendix E.2. Subjects either completed this task while completely alone (the task was presented and scored by computer) or with the experimenter observing them through a glass door (from almost directly behind). This was seen as a non-distracting manipulation which was also unlikely to produce drive effects due to mere presence of the experimenter. Crossed with the independent variable of Type and the alone versus observer manipulation was a monetary incentive versus no incentive condition.

F.2.2 Incentive Condition

In the no incentive condition subjects believed that they were being paid a moderate sum of money ($3.22) just for attending and taking part in the experiment. In the incentive condition they were led to believe that the sum they would receive was contingent on fast accurate task performance. They were led to believe that the computer calculated the amount of money that they were to receive by employing a formula which gave equal weight to speed and accuracy of performance (at the end of the task they were debriefed and also received $3.22).

F.3 <u>Results</u>

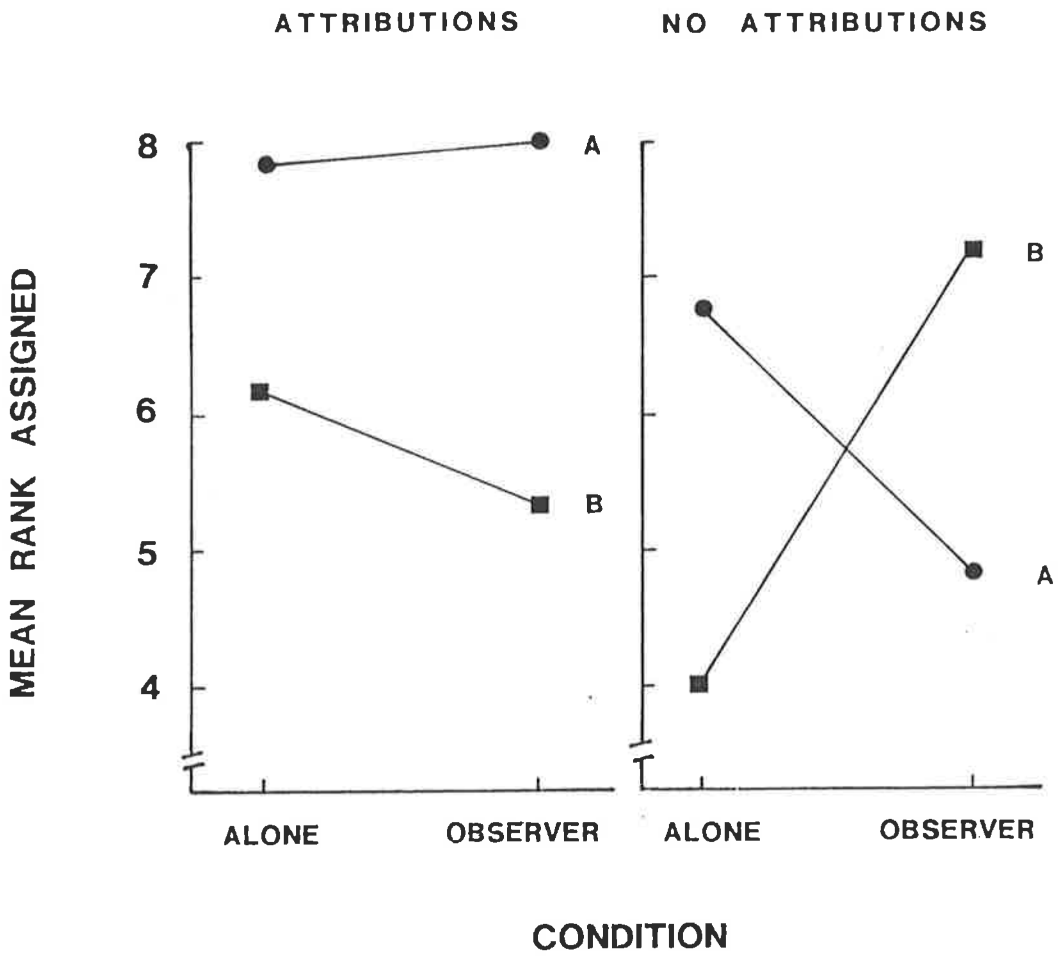
No significant main or interaction effects whatsoever were found in the performance data from this experiment.

F.4 <u>Discussion</u>

There seemed to be a number of possible explanations for the failure of this experiment to produce any significant effects. Firstly, the incentive condition may have lacked power. Subjects may just not have been offered enough money. Subjects who received the money for just attending may have tried as hard as they could, meaning that the incentive condition might not motivate subjects to try any harder (they believed that. with very good performance, they might receive as much as $5.00).

Secondly, the social condition may have failed to affect subjects due to the observer's distance from them. Thirdly, the criterion for selection of subjects may not have been rigo rous enough (as discussed at some length in chapter 7). However, the most likely reason for the failure of this experiment may have been the nature of the task. The designer of this task was also dissatisfied with its usefulness as a challenging cognitive exercise and discontinued using it shortly after this experiment was completed (see note 7).

Figure 1: Three way interaction effect of Type, Social Condition and Attributions (during or after the task) on subjects' ratings of the importance of amount of ability as a factor affecting their performance on the task.



APPENDIX G: APPENDIX TO CHAPTER 8

G.1

TASK INSTRUCTIONS

In this task you will be required to solve anagrams or jumbled words.

You will be presented with 24 5-lettered anagrams, one at a time.

After the first trial of 12 anagrams the computer will automatically present you with feedback about the speed of your performance.

For each anagram you must type in your solution as quickly as possible.

TAKE CARE to type the first letter correctly as this letter stops the timer and therefore cannot be corrected.

After you have typed in this first letter, you have 15 seconds to type the other 4 letters and press the RETURN key at the lower right-hand end of the keyboard.

Should you mis-type any of these 4 letters, you can correct it by using the DELETE key at the lower right-hand end of the keyboard to "rub out"your mistake and then retyping the letter.

CAUTION do not attempt to delete the first letter of your solution as this will score as an error.

The computer will automatically present each anagram and time your solution.

After you type your solution and press RETURN it will automatically present the correct solution for a few seconds before going on to present the next anagram.

You will be given 60 seconds to solve each anagram, if you do not start to type in your solution within that time the computer will automatically present you with the correct solution and then go on to present the next anagram.

After trial two please complete the POST-TASK QUESTIONNAIRE and then call out to the experimenter that you are finished.

G.2

Table 1: Mean squares, F ratios and significance levels for analyses of trial one performance data

	Latencies for Correct Resps.	No. Correct	No. of Errors
<u>Main Effects</u>	(3), 326.9 – –	(3), 2.9 – –	(3), 0.8 – –
Type	(2), 225.9 – –	(2), 0.85 – –	(2), 1.2 – –
Condition	(1), 521.3 – –	(1), 6.8 – –	(1), 0.1 – –
<u>Interaction</u>	(2), 142.5 – –	(2), 2.2 – –	(2), 5.5 F=3.77, p=0.032
Explained	(5), 253.1 – –	(5), 2.6 – –	(5), 2.7 – –
Residual	(37), 387.5	(37), 3.4	(37), 1.5
Total	(42), 371.5	(42), 3.3	(42), 1.6

Note: Only significance levels (and F-ratios) $p<0.1$ are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

G.3

Table 2: Mean squares, F ratios and significance levels for analyses of trial two performance data

	Latencies for Correct Resps.	No. Correct	No. of Errors
Main Effects	(4), 0.28 - -	(4), 3.0 - -	(4), 2.78 - -
Type	(2), 0.27 - -	(2), 3.0 - -	(2), 2.12 - -
Condition	(2), 0.28 - -	(2), 2.9 - -	(2), 2.32 - -
Interaction	(4), 0.54 - -	(4), 8.46 F=3.47, p=0.014	(4), 4.02 F=2.55 p=0.050
Explained	(8), 0.41 - -	(8), 5.74 F=2.35, p=0.031	(8), 3.40 F=2.15 p=0.047
Residual	(52), 0.27	(52), 2.44	(52), 1.58
Total	(60), 0.29	(60), 2.88	(60), 1.82

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

APPENDIX H

Brief paper presenting some data from chapter 4, published in the journal of _Perceptual and Motor Skills_, 1982.

Herbertt, R. M. & Innes, J. M. (1982). Type A coronary-prone behavior pattern, self-consciousness, and self-monitoring: a questionnaire study. *Perceptual and Motor Skills, 55*(2), 471-478.

NOTE:

This publication is included in the print copy
of the thesis held in the University of Adelaide Library.

APPENDIX I

Brief paper presenting some data from chapter 5, published in the journal of *Personality and Individual Differences*, 1983.

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A CRITICAL EVALUATION OF SOME COMMONLY-EMPLOYED METHODS FOR THE ASSESSMENT OF TYPE A CORONARY-PRONE BEHAVIOUR

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Summary—Type A coronary-prone behaviour has been repeatedly associated with an increased incidence of coronary heart disease (CHD) amongst middle-aged men and women. This association appears to be independent of other standard CHD risk factors such as smoking, high blood pressure and elevated serum cholesterol levels. This paper presents normative and correlational data for a number of commonly-employed self-report measures of Type A behaviour and the structured interview. These data replicate U.S. findings that self-report measures tend to correlate only moderately with the Structured-Interview method of assessment of Type A behaviour. The implications of these data for researchers attempting to assess Type A behaviour, especially with limited resources, are discussed.

Type A coronary-prone behaviour has been repeatedly implicated as a risk factor associated with a significantly increased incidence of coronary heart disease (CHD). This pattern of behaviour has been reliably associated with development of CHD in a number of prospective and retrospective studies (e.g. Friedman and Rosenman, 1974; Jenkins, Rosenman and Zyzanski, 1974; Jenkins, 1976). Perhaps the best evidence for the link between Type A behaviour and the development of CHD comes from the Western Collaborative Group Study. Rosenman, Brand, Jenkins, Friedman, Straus and Wurm (1975) report that at an 8.5-year follow-up of over 3000 middle-aged men, those classified as Type A were about twice as likely as those classified as Type B to have suffered some form of CHD. This relationship was independent of other standard CHD risk factors, such as hypertension, smoking and blood lipid levels.

Friedman and Rosenman (1974, p. 84) have defined Type A behaviour as:

> "an action-emotion complex that can be observed in a person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other things or persons."

At the moment there is really no clear theory to explain mechanisms which may link Type A behaviour and CHD. Type A behaviour has been associated with increased noradrenaline secretion in stressful situations (e.g. Friedman, St George and Byers, 1960; Friedman, Byers, Diamant and Rosenman, 1975; Simpson, Olewine, Jenkins, Ramsey, Zyzanski, Thomas and Hames, 1974), with elevated serum cholesterol levels and with significantly higher degrees of coronary atherosclerosis amongst middle-aged men (Blumenthal, Williams, Kong, Schanberg and Thompson, 1978).

ASSESSMENT OF TYPE A BEHAVIOUR

Structured interview

The Structured Interview (SI) was developed by Rosenman and Friedman, the researchers who pioneered investigation of Type A behaviour. The SI consists of about 24 questions asked of *S*s in an interview setting by a single trained interviewer. Interviews are usually videotaped to facilitate rescoring of the *S*'s responses. Questions such as:

> "2. Do you think that your are a hard-driving, no nonsense sort of achiever, or do you believe that you tend to do things in a rather leisurely manner?" (Friedman, Thoresen and Gill, 1981),

ask Ss about their usual mode of dealing with or responding to their environment. In other questions, such as:

> "12. Most working people usually arise before 8.30 am on weekdays although they may sleep in longer on Saturdays and Sundays. Now in your case, during the weekdays, at what time do you, uh . . .." (Friedman *et al.*, 1981)

the interviewer deliberately stalls. This is a direct behavioural test of *Ss* as Type A *S*s will often interrupt or hurry the interviewer.

A number of questions in the SI allow the interviewer to challenge the *S*'s response or to probe for more information where it might be relevant. Such a question is:

> "25. What would you do if you and your wife were at a fine restaurant and she was becoming ill from the cigar smoke reaching her from a man sitting at the table next to yours?" (Friedman *et al.*, 1981)

Even if this question fails to elicit a Type A style of response, the subsequent challenge:

> "Suppose the smoker says-drop dead, mister"

is almost certain to elicit a hostile response from a Type A *S*. In comparison Type B *S*s very often respond to such a challenge with a curious, half-amused expression (see Friedman *et al.*, 1981).

Not only the content of *S*s' responses to the questions is scored on the SI but also their style of speech and behaviour. Type A *S*s tend to speak rapidly and explosively, and to interrupt, even on questions that are not designed to elicit an interruption. During the SI Type A *S*s tend to exhibit characteristic fast, jerky and repetitive movements, over-forceful gestures and signs of generally high nervous tension. Type A *S*s also tend to make hostile responses when challenged and to make hostile over-generalizations.

The SI usually takes about 12–18 min to administer, with subsequent rescoring greatly increasing the time required per S. Interviewers are specially trained to present the interview in a standardized fashion and to score content and behaviour. At the moment this training is only available in San Francisco.

Self-report measures

Due to the obvious expense and time involved in using the SI, especially in large projects, a number of self-report measures of Type A behaviour have been developed. The most widely used of these is the *Jenkins Activity Scale for Health Prediction* (JAS), developed by Jenkins, Rosenman and Friedman (1967) in an attempt to duplicate the SI assessment of Type A behaviour. After discriminant function and factor analyses were carried out the JAS was found to load on four factors: Type A behaviour, Speed and Impatience, Hard-Driving and Aggressive and Job Involvement. Zyzanski and Jenkins (1970) found that the JAS Type A scale showed 72% agreement with the SI. The JAS Type A scale was also found to be significantly related to CHD risk (Jenkins *et al.*, 1974). It is not however, as good a predictor of CHD as the SI (Brand, Rosenman, Sholtz and Friedman, 1976).

The JAS has been criticized for its misclassification of too many respondents in comparison to the SI (see Jenkins, 1978). Ray and Bozek (1980) have criticized the JAS for its length and relatively low reliability in relation to the standards acceptable for psychometric measures. The JAS is still widely used however, due to its ease of application, especially with a machine-scored version now available (Jenkins, 1979).

Shorter self-report measures of Type A behaviour than the JAS are available. Bortner (1969) developed a 14-item scale, with a 7-item short form. This scale has not been used to predict CHD and has been criticized for its low correlation with the JAS (Herbertt and Innes, 1982). A 9-item Type A scale developed by Vickers (1973) has gained fairly wide, informal usage but utility in predicting CHD, reliability figures and comparisons with proven measures have not been reported.

This study was designed to investigate the relationship between the JAS, Bortner's and Vickers' self-report measures of Type A behaviour and the SI. From the literature the JAS appears to be the most convenient and reliable instrument available for assessment of Type A behaviour as, although the SI is a better predictor of CHD, expensive interviewer training is required and it is time consuming for large *S* groups. The Bortner and Vickers scales were included in this study due to the attractiveness of their extreme ease of application.

METHOD

Questionnaire scales

Scores for the Type A, Speed and Impatience, and Hard-Driving and Aggressive scales of the JAS were computed (weighted scoring system). Scores on the Job Involvement scale of the JAS were not computed as most of the *S*s had only ever been full-time students. Scores for the short form (7-items) of the Bortner Type A scale (Bortner, 1969) and the Vickers Type A scale (Vickers, 1973) were also computed.

Subjects and interview procedure

Undergraduate students ($n = 205$) taking a first-year course in psychology completed a package of questionnaires as part of a course requirement. *S*s from this group were approached to take part in the SI. Interviews were carried out by the author who was trained in SI presentation and scoring by the Harold Brunn Institute in San Francisco. All interviews were scored 'live' and then the videotape of the interview scored again. As no other trained interviewer(s) were available to check this scoring, any *S*s who the author had any doubts about classifying did not have their scores included in the subsequent analysis ($n = 95$).

RESULTS

Normative data for all measures used in this study are presented in Table 1. Self-report data are presented for the whole sample as well as SI data for a selected group of *S*s ($n = 95$). Forty-seven of the selected *S*s had JAS Type A scale scores of 1 SD or greater from the sample mean. The remainder of this sample were selected at random. The only measure affected by sex of *S* was the Bortner Type A scale, on which females scored significantly higher (in the Type A direction) than males ($F = 9.63$, $df = 1{,}202$, $P = 0.002$).

The correlation matrix for all measures is presented in Table 2. At best the self-report measures of Type A behaviour only correlate moderately with the SI measure. The JAS Type A and Speed and Impatience scales correlate significantly with the SI ($r = 0.38$, $n = 95$, $P < 0.001$) but these correlations account for less than 15% common variance. It is the Vickers type scale that shows the best correlation with the SI ($r = 0.42$, $n = 95$, $P < 0.001$). The Vickers scale also correlates moderately well with the JAS Type A ($r = 0.45$, $n = 205$, $P < 0.001$) and Hard-Driving and Aggressive ($r = 0.52$, $n = 205$, $P < 0.001$) scales. Inter-correlations between the JAS scales are reasonable with moderate correlations between the Type A scale and the Speed and Impatience, and Hard-Driving and Aggressive scales ($r = 0.56$, $n = 205$, $P < 0.001$). The Bortner Type A scale appears to be the least useful of the self-report measures as, although it correlates moderately well with the JAS Type A scale ($r = 0.43$, $n = 205$, $P < 0.001$), it correlates only poorly with the SI ($r = 0.25$, $n = 95$, $P < 0.01$).

Table 1. Interview and questionnaire scales normative data

	Surveyed population			Selected sample		
	Mean	SD	*n*	Mean	SD	*n*
Structured Interview	—	—	—	143.6	78.7	95
JAS scales						
Type A	220.2	63.0	205	212.2	75.5	95
Speed and Impatience	168.2	54.4	205	166.6	57.3	95
Hard-Driving and Aggressive	109.4	27.4	205	106.5	29.5	95
Vickers Type A	27.0	10.3	205	28.5	10.5	95
Bortner Type A	25.7*	3.7	205	25.6	3.4	95
Age	19.2	4.3	201	20.5	5.7	93

*There was a significant difference between males ($\bar{X} = 24.6$) and females ($\bar{X} = 26.2$) for Bortner scale scores ($F = 9.63$, $df = 1{,}202$, $P = 0.002$).

Table 2. Interview and questionnaire scales correlation matrix

Measures	2	3	4	5	Bortner scale
Structured Interview	0.38**	0.38**	0.35**	−0.42**	0.25*
JAS scales					
2. Type A		0.56**	0.56**	−0.45**	0.43**
3. Speed and Impatience			—	−0.16	0.31**
4. Hard-Driving and Aggressive				−0.52**	0.24**
5. Vickers Type A					0.16*

All correlation coefficients (Pearson product–moment) presented are significant at the 0.05 level.
$*P < 0.01$. $**P = 0.001$.

DISCUSSION

The JAS scales were not expected to correlate highly with the SI as it has been reported elsewhere (see Jenkins, 1978), that the JAS misclassifies up to one third of respondents when compared to SI classification. Chesney, Black, Chadwick and Rosenman (1981) have reported even lower correlations between SI and JAS scale scores than found in this study. Chesney *et al.* (1981) reported data from a sample of 384 employed male *S*s. They found correlations between the SI and JAS Type A scale of $r = 0.26$, between the SI and the JAS Speed and Impatience scale of $r = 0.23$ and between the SI and the JAS Hard-Driving and Aggressive scale of $r = 0.22$ (all correlations significant at the 0.001 level).

The fact that Chesney *et al.* (1981) found lower correlations between the SI and JAS than found in this study is surprising as both measures were developed for samples of working males as used in their study and not for student samples as used here. Half of the interviewed sample in this study had extreme ($\geqslant$ 1SD) scores on the JAS Type A scale. Although this may have artificially-increased correlations involving the JAS Type A scale, it should also have served to enhance the similarity of this sample to the sample used by Chesney *et al.* Their sample of middle-aged men could be expected to have a higher proportion of extreme Type A scale scorers than a randomly-selected student sample.

The magnitude of correlations between the SI and the self-report measures, which all purport to be measures of Type A behaviour, must concern all users of such instruments. Chesney *et al.* (1981) conclude from their data (which are essentially replicated by the data reported here) that self-report measures may not yield valid assessments of Type A behaviour. They advise that Type A–B classification of *S*s by the use of self-report measures should be treated as tentative.

A number of factors may combine to make the self-report measures poor methods of assessing Type A behaviour. Innes (1981) has suggested that the JAS may fail to actively challenge *S*s thereby failing to elicit Type A behaviours. Friedman *et al.* (1981) believe that Type A *S*s find the SI challenging and engaging, but tend to see self-report procedures as a waste of time. Friedman *et al.* (1981) also suggest that Type A individuals may not readily admit to possessing Type A behaviours, either because they lack awareness of their own behaviour pattern or because they are reluctant to admit the full extent of it. Jenkins (1978) proposes that it is much easier for respondents to dissemble on self-report measures than during the SI.

The Bortner Type A scale showed the worst correlation with the SI of all the self-report measures. This correlation accounts for only a little over 6% of variance common to both measures. Price and Clarke (1978) have reported a correlation of $r = 0.47$ between the Bortner scale and an unweighted JAS total score (using a student sample). They used a weighted scoring system for the Bortner scale (see Bortner, 1969) however, which was not used here. The poor performance of the Bortner scale in this study may be due to a failure to employ the weighted scoring system. This omission is unlikely to be solely at fault however, as Ray and Bozek (1980) have observed that weighted scoring systems for psychometric instruments are very often proven to be of little value.

The Vickers Type A scale performed well in this study. It correlated moderately well with the SI, being the best of all the self-report measures in this respect. It also correlated moderately well with the JAS Type A and Hard-Driving and Aggressive scales. These data and the brevity and ease of application of the Vickers scale make it a very appealing instrument. However the Vickers scale has not been widely used and its reliability and validity must be questioned.

It is rather easy to presume that shortcomings in the self-report measures are solely to blame for the only moderate correlations found between the SI and self-report measures. The validity of the SI, as used in this study, must be questioned however. Well-controlled studies in the U.S.A. that have used the SI have frequently used a number of trained interviewers in attempting to produce accurate assessment of Type A behaviour (e.g. Chesney *et al.*, 1981). The SI assessments of the author could not be validated in this way. The SI was originally developed for use with middle-aged males in the U.S.A. and thus its generalizability to a sample of male and female Australian undergraduate university students must also be considered when interpreting these data.

The SI has been used to assess Type A behaviour in a number of studies of university undergraduate students in the U.S.A. (Matthews, Krantz, Dembroski and MacDougal, 1982), although obviously it has not been used to predict CHD incidence in such samples. Although no data have been reported for the generalizability of the SI to Australian samples, it has been used in other non-American countries such as Belgium (Kittel, Kornitzer, Zyzanski, Jenkins, Rustin and Degre, 1978). Australian *S*s seem to manifest the same Type A pattern of behaviour during the SI as their American counterparts. It is not known whether the Type A behaviour observed in Australian *S*s is associated (as it is for American *S*s) with increased risk of CHD at this stage.

CONCLUSION

The data reported here are not encouraging for researchers using or intending to use self-report measures of Type A coronary-prone behaviour. The generally low to moderate correlations (found here and elsewhere) between these measures and the SI tend to cast serious doubts on the utility of the self-report measures for assessing Type A behaviour. However some reservations must also be held about the validity of SI assessment in situations where validation of scoring by a single interviewer is not available.

Assessment of Type A behaviour is likely to prove problematic for researchers who are isolated from the mainstream of investigation using the SI in the U.S.A. The problems involved in using the SI are greatly exacerbated for researchers outside of the U.S.A. by the expense and difficulty involved in travelling to the U.S.A. for training. Subsequent to this training, checks on the reliability of the isolated researcher's interviewing are also difficult to arrange.

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APPENDIX J: APPENDIX TO CHAPTER 9

J.1

QUESTION SHEET ONE

Please complete the following questions before commencing trial two.

To what extent was each of the following factors related to your performance during TRIAL ONE (please use the following system to assign a rank to each of the four factors)?

Ranking System:

Not a Cause				Somewhat a Cause				Very Much a Cause
1	2	3	4	5	6	7	8	9

Factors:

1. Ease (or difficulty) of the task . . . :
2. Amount of effort . . . . :
3. Luck . . . . :
4. Amount of ability . . . . :

Please circle the appropriate rank in the question below.

5. As the task continues, will you:-

Try Much harder?				Put in about the same effort?				Stop trying so hard?
1	2	3	4	5	6	7	8	9

Please commence TRIAL TWO

QUESTION SHEET TWO

Please complete the following questions after trial two.

To what extent was each of the following factors related to your performance during TRIAL TWO (please use the following system to assign a rank to each of the four factors)?

Ranking System:

Not a Cause				Somewhat a Cause				Very Much a Cause
1	2	3	4	5	6	7	8	9

Factors:

1. Ease (or difficulty) of the task . . . .:
2. Amount of effort . . . .:
3. Luck . . . .:
4. Amount of ability . . . .:

Please circle the appropriate rank in the question below.

5. How happy were you with your performance on trial two

Very happy?								Very unhappy?
1	2	3	4	5	6	7	8	9

Thankyou very much.

Please tell the experimenter that you are finished.

Table 1: Means, standard deviations and subject numbers for the 2-way interaction on subjects' ratings of their intentions during trial two (made after trial one) of experiment two by Type and Social Condition.

	Social Condition		
	Alone	Observed	Mirror
Type A	$\bar{X}$=3.07 SD=1.49 n=14	$\bar{X}$=4.00 SD=1.65 n=12	$\bar{X}$=5.07 SD=1.58 n=15
Type B	$\bar{X}$=4.05 SD=1.61 n=20	$\bar{X}$=4.00 SD=1.17 n=17	$\bar{X}$=3.74 SD=1.41 n=19

J.4

Table 2: Mean squares, F ratios and significance levels for analyses of trial one attributions data from experiment two.

	Luck? Question 3	Try harder? Question 5
Main Effects	(3), 3.8 – –	(3), 2.8 – –
Type	(1), 2.4 – –	(1), 0.48 – –
Condition	(2), 4.5 – –	(2), 3.9 – –
2-way Interaction	(2), 12.0 F=3.28, p=0.042	(2), 11.1 F=5.02, p=0.009
Explained	(5), 7.1 – –	(5), 6.1 F=2.76, p=0.023
Residual	(89), 3.7	(91), 2.2
Total	(94), 3,8	(96), 2.4

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

J.5

Table 3: Means, standard deviations and subject numbers for the 2-way interaction on subjects' ratings of the importance of luck as a factor affecting their performance during trial one of experiment two by Type by Social Condition.

	Social	Condition	
	Alone	Observed	Mirror
Type A	$\bar{X}=3.21$	$\bar{X}=1.75$	$\bar{X}=2.28$
	SD=2.05	SD=1.22	SD=2.20
	n=14	n=12	n=14
Type B	$\bar{X}=2.15$	$\bar{X}=2.59$	$\bar{X}=3.61$
	SD=1.57	SD=1.76	SD=2.33
	n=20	n=17	n=18

J.6

Table 4: Means, standard deviations and subject numbers for the 2-way interaction on subjects' ratings of the importance of luck as a factor affecting their performance during trial two of experiment two by Type and Social Condition.

	Social Condition		
	Alone	Observed	Mirror
Type A	$\bar{X}$=3.93 SD=2.26 n=14	$\bar{X}$=1.50 SD=0.80 n=12	$\bar{X}$=2.57 SD=2.53 n=14
Type B	$\bar{X}$=2.60 SD=2.01 n=20	$\bar{X}$=3.06 SD=2.33 n=17	$\bar{X}$=3.44 SD=2.31 n=18

Table 5: Mean squares, F ratios and significance levels for analyses of trial two attributions data from experiment two.

	Luck? (Question 3)
Main Effects	(5), 2.9
Type	(1), 2.2
Condition	(2), 4.7
Feedback	(2), 1.5
2-way Interactions	(8), 9.1
Type X Cond	(2), 18.1 F=3.98, p=0.023
Type X Fbk	(2), 3.5
Cond X Fbk	(4), 6.8
3-way Interaction	(4), 5.2
Explained	(17), 6.4
Residual	(77), 4.5
Total	(94), 4.8

Note: Only significance levels (and F-ratios) $p<0.1$ are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

Table 6: Mean squares, F ratios and significance levels for analysis of number of errors made during trial two of experiment two by Type by Social Condition by False Feedback with rating of intention to try harder on trial two as a covariate.

	df	MS	F-ratio	p
Covariate:				
Intention to try harder	1	0.2	0.09	0.761
Main Effects:	5	4.8	2.82	0.022
Type	1	0.4	0.24	0.626
Condition	2	3.6	2.12	0.127
Feedback	2	8.2	4.78	0.011
2-way Interactions:	8	2.6	1.53	0.159
Type by SC	2	4.2	2.48	0.091
Type by FBK	2	0.3	0.19	0.827
SC by FBK	4	3.2	1.85	0.127
3-way Interaction:	4	0.3	0.19	0.942
Explained	18	2.6	1.51	0.109
Residual	78	1.7		
Total	96	1.9		

J.9

Table 7: Mean squares, F ratios and significance levels for analysis of difference between number of errors made during trial two and number of errors made during trial one (of experiment two) by Type by Social Condition by False Feedback with rating of intention to try harder on trial two as a covariate.

	df	MS	F-ratio	p
Covariate:				
Intention to try harder	1	0.9	0.62	0.432
Main Effects:	5	5.1	3.60	0.006
Type	1	2.3	1.63	0.206
Condition	2	2.7	1.47	0.236
Feedback	2	9.7	6.84	0.002
2-way Interactions:	8	1.8	1.24	0.288
Type by SC	2	0.6	0.44	0.646
Type by FBK	2	2.1	1.50	0.229
SC by FBK	4	2.1	1.49	0.213
3-way Interaction:	4	0.4	0.27	0.898
Explained	18	2.3	1.65	0.069
Residual	78	1.4		
Total	96	1.6		

Table 8: Mean squares, F ratios and significance levels for analysis of number of errors made during trial two (of experiment two) by Type by Social Condition by False Feedback with trial one performance indices (number of errors, number correct and latencies for correct responses) and rating of intention to try harder on trial two as covariates.

	df	MS	F-ratio	p
Covariates:	4	10.0	7.60	0.001
No. of Errors	1	33.9	25.68	0.001
Latency Correct	1	0.6	0.41	0.522
Number Correct	1	3.1	2.34	0.130
Intention to try harder	1	0.2	0.12	0.731
Main Effects:	5	5.1	3.84	0.004
Type	1	1.3	1.00	0.321
Condition	2	3.2	2.41	0.096
Feedback	2	8.9	6.71	0.002
2-way Interactions:	8	1.8	1.33	0.240
Type by SC	2	1.6	1.16	0.320
Type by FBK	2	0.8	0.61	0.548
SC by FBK	4	2.4	1.79	0.140
3-way Interaction:	4	0.2	0.15	0.961
Explained	21	3.8	2.90	0.001
Residual	75	1.3		
Total	96	1.9		

Table 9: Mean squares, F ratios and significance levels for analysis of trial two attributions data from experiment two (attributions concerning happiness with previous performance) by Type by Social Condition by False Feedback with performance indices as covariates (number of errors, latencies for correct responses and number of correct responses).

	df	MS	F-ratio	p
Covariates:	3	30.6	10.30	0.001
No. of Errors	1	1.1	0.36	0.551
Latency Correct	1	6.1	0.16	0.157
Number Correct	1	65.0	21.84	0.001
Main Effects:	5	3.2	1.07	0.384
Type	1	1.2	0.41	0.524
Condition	2	0.1	0.03	0.967
Feedback	2	7.2	2.43	0.096
2-way Interactions:	8	3.0	1.01	0.434
Type by SC	2	2.6	0.88	0.418
Type by FBK	2	3.0	1.02	0.336
SC by FBK	4	3.3	1.09	0.336
3-way Interaction:	4	1.2	0.40	0.810
Explained	20	6.8	2.30	0.005
Residual	76	3.0		
Total	96	3.8		

J.12

QUESTION SHEET ONE (from experiment 3)

Please complete the following questions before commencing trial two.

To what extent was each of the following factors related to your performance during TRIAL ONE (please use the following system to assign a rank to each of the four factors)?

Ranking System:

Not a Cause				Somewhat a Cause				Very Much a Cause
1	2	3	4	5	6	7	8	9

Factors:

1. Ease (or difficulty) of the task . . . :
2. Amount of effort . . . . :
3. Luck . . . . :
4. Amount of ability . . . . :

Please circle the appropriate rank in the question below.

5. As the task continues, will you:-

Try Much harder?				Put in about the same effort?				Stop trying so hard?
1	2	3	4	5	6	7	8	9

Please commence TRIAL TWO

J.13

QUESTION SHEET TWO

Please complete the following questions after trial two.

To what extent was each of the following factors related to your performance during the task (please use the following system to assign a rank to each of the four factors)?

Ranking System:

Not a Cause				Somewhat a Cause				Very Much a Cause
1	2	3	4	5	6	7	8	9

Factors:

1. Ease (or difficulty) of the task . . . .:

2. Amount of effort . . . .:

3. Luck . . . .:

4. Amount of ability . . . .:

Please circle the appropriate rank in the question below.

5. How happy were you with your performance on this task

Very happy?								Very unhappy?
1	2	3	4	5	6	7	8	9

Thankyou very much.

Please tell the experimenter that you are finished.

Table 10: Means, standard deviations and subject numbers for the 2-way interaction on subjects ratings of importance of amount of effort as a factor affecting their performance during experiment three of Type and Social Condition.

	Social Condition		
	Alone	Video	Attribution
Type A	$\bar{X}$=5.88 SD=2.85 n=8	$\bar{X}$=7.25 SD=1.17 n=6	$\bar{X}$=5.50 SD=1.38 n=8
Type B	$\bar{X}$=4.50 SD=2.35 n=6	$\bar{X}$=6.33 SD=1.21 n=6	$\bar{X}$=5.33 SD=1.86 n=6
Type X	$\bar{X}$=6.88 SD=2.72 n=8	$\bar{X}$=4.00 SD=2.83 n=6	$\bar{X}$=6.33 SD=2.73 n=7

Table 11: Mean squares, F ratios and significance levels for analyses of trial two attributions data from experiment three.

	Effort? Question 2	Happy? Question 5
Main Effects	(4), 2.0 - -	(4), 3.2 - -
Type	(2), 3.9 - -	(2), 1.8 - -
Condition	(2), 0.1 - -	(2), 4.7 - -
2-way Interaction	(4), 14.0 F=3.01, p=0.026	(4), 8.3 F=2.43, p=0.015
Explained	(8), 8.0 - -	(8), 5.7 F=2.38, p=0.029
Residual	(52), 4.7	(52), 2.4
Total	(60), 5.1	(60), 2.9

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

J.16

Table 12: Means, standard deviations and subject numbers for the 2-way interaction on subjects ratings how happy they were with their performance during experiment three of Type and Social Condition.

	Social Condition		
	Alone	Video	Attribution
Type A	$\bar{X}$=5.13 SD=1.13 n=8	$\bar{X}$=3.63 SD=1.85 n=6	$\bar{X}$=7.00 SD=1.41 n=8
Type B	$\bar{X}$=4.67 SD=1.97 n=6	$\bar{X}$=5.33 SD=1.37 n=6	$\bar{X}$=5.17 SD=1.17 n=6
Type X	$\bar{X}$=5.38 SD=1.51 n=8	$\bar{X}$=6.00 SD=2.08 n=6	$\bar{X}$=5.33 SD=1.03 n=7

J.17

Table 13: Means, standard deviations and subject numbers for the 2-way interaction on subjects ratings the importance of luck as a factor affecting their performance during experiment three of Type (without Type X subjects) and Social Condition.

	Social Condition		
	Alone	Video	Attribution
Type A	$\bar{X}$=3.50 SD=2.67 n=8	$\bar{X}$=1.63 SD=1.06 n=6	$\bar{X}$=1.33 SD=0.52 n=8
Type B	$\bar{X}$=2.00 SD=1.09 n=6	$\bar{X}$=4.00 SD=2.76 n=6	$\bar{X}$=3.17 SD=2.40 n=6

Table 14: Mean squares, F ratios and significance levels for analysis of trial two attributions data from experiment three (attributions concerning the importance of luck-without Type X subjects).

	Luck? Question 3
Main Effects	(3), 3.3
Type	(1), 7.3
Condition	(2), 1.5
2-way Interaction	(2), 14.9 F=3.84, p=0.031
Explained	(5), 7.9 F=2.04, p=0.098
Residual	(34), 3.9
Total	(39), 4.4

Note: Only significance levels (and F-ratios) p<0.1 are reported in this table. Reported are:
(degrees of freedom), mean square
F-ratio, significance level

Table 15: Mean squares, F ratios and significance levels for analysis of trial two attributions data from experiment three (attributions concerning happiness with previous performance) by Type by Social Condition with number of correct responses from trials 1 and 2 as covariates.

	df	MS	F-ratio	p
Covariates:	2	10.1	4.40	0.017
No. Correct (T1)	1	0.6	0.27	0.608
No. Correct (T2)	1	18.7	8.16	0.006
Main Effects:	4	5.5	2.39	0.063
Type	2	3.6	1.55	0.222
Condition	2	7.8	3.42	0.041
2-way Interactions:	4	3.7	1.60	0.189
Explained	10	5.7	2.47	0.017
Residual	50	2.3		
Total	60	2.9		

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