# To kill or not to kill: <br> Competition, aggression, and videogames, in adolescents 

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## Declaration

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#### Abstract

The competition-aggression link is a hypothesis that competition increases the probability of aggressive behaviour. The current investigation was focussed on this idea. There were two approaches utilised to conduct this investigation. Firstly, a literature review of empirical research was conducted using a critical procedure. Secondly, a series of studies were carried out that were guided by past research in the field.

The literature review entailed the search for and collection of empirical research on competitive aggression. There were 41 independent studies on this topic published between 1949 to 1997. Over half of these studies ( $68 \%$ ) utilised Taylor's competitive reaction procedure. A number of conclusions were reached from a review of the literature. The competition-aggression link has been consistently demonstrated across a number of studies, and a number of situational and personality factors have been found to mediate the link. However, few studies have validated the dependent measure of aggression. One study explored competitors' angry feelings. Nearly all data were collected in North America and no studies have been published from the Australian context. Finally, few studies have been conducted on adolescents. A series of studies were thus conducted to fill a knowledge gap on this topic. These studies were based on Australian adolescents.

Two survey studies (Studies 1 and 5) were conducted on a general sample of adolescents and a specific sample of videogame players (viz, highly experienced Mortal Kombat players). The methodology was derived from a study by Anderson and Morrow (Study 1; 1995) who devised two measures to evaluate perceptions of competition and cooperation i.e., the Dimensional Ratings Questionnaire (DRQ) and the Common Features Questionnaire (CFQ). Data from the DRQ and CFQ revealed that all participants perceived competitive situations as aggressive, and cooperative situations as less aggressive. There was no variation in these perceptions across gender or videogame playing frequency groups. However, Mortal Kombat players tended to perceive cooperative situations as more aggressive in comparison to the


general sample of adolescents. These findings provide suggestive evidence for underlying competition and cooperation schemas that are consistent with the competition-aggression link.

A series of studies (Studies 2 to 4) was conducted on adolescents using videogame play as a measure of aggression. The procedure was derived from a study by Anderson and Morrow (Study 2; 1995). Paired participants were randomly assigned to either a competitive or cooperation situation. The dependent measure was the 'kill ratio' (defined as the number of videogame characters the participant kills divided by the total number of characters encountered i.e., killed plus avoided). It was consistently revealed across all three studies that male and female competitive participants did not demonstrate a higher 'kill ratio' than male and female cooperative participants (with the exception of an interaction effect in Study 2). These findings were reported despite the wide variation in utilised videogames and methodological designs.

Another series of studies of greater experimental power was conducted. Participants were self-selected males who were highly experienced at Mortal Kombat. The utilised videogame, which is a martial arts simulation, provides the winner the choice either to kill or not kill the opponent's videogame character. Study 6 revealed that winning participants were more likely to select the option to kill their opponent's videogame character during a high competitive situation (a tournament for prizes) than during a low competitive situation (i.e., a trial period). Study 7 was a replication of the previous study but excluded the prizes awarded during the tournament. Killing tendencies did not vary across the toumament and trial periods. This implies that a reward is an important element in the competition-aggression link. Study 8 replicated the findings of Study 6 in a non-tournament situation, thus increasing the reliability of the effect and discounting the influence of extraneous factors in the tournament situation (e.g., an audience). Study 8 also revealed that competitive aggression was displayed in the absence of self-reported angry feelings as measured by the State-Anger Scale (Spielberger, 1991). That is, the competitive aggression was 'affectless'. Study 9 showed that the kill ratio is a valid measure of aggressive behaviour by correlating Mortal Kombat videogame aggression with teacher ratings of participants' aggressive behaviour at school.

A number of conclusions were reached on the basis of the literature review and these studies. These include: Adolescents and adults perceive competitive situations as aggressive, and perceive cooperative situations as less aggressive; children, male adolescents, and adults, behave more aggressively during competitive situations relative to cooperative situations, and behave less aggressively during low competitive situations relative to high competitive situations; competitive aggression is 'affectless' amongst experienced videogame playing adolescent males and less experienced videogame playing university students. Recommendations were proposed for future research in this field, and strategies were formulated for preventing and reducing competitive aggression.

## CHAPTER 1

## Competition is Linked with Aggression

### 1.1 Overview

The current thesis examines the notion that competition causes or leads to aggression. This phenomenon will be referred to as the competition-aggression link. Some authors have called this effect the 'competition-aggression hypothesis' (Gaebelein \& Taylor, 1971; Russell \& Drewry, 1976), but this term is avoided so as not to confuse the supposed phenomenon with the contentious frustration-aggression hypothesis as proposed by Dollard, Doob, Miller, Mowrer, and Sears (1939). The competition-aggression link is a 'working hypothesis' based on anecdotal evidence and empirical evidence. This thesis examines literature and reports research on the notion that there is a relationship between competitive situations and aggressive behaviour. The experimental work was conducted on adolescents in order to fill a knowledge gap with respect to this age group. Whilst spectator aggression around sports matches is well documented (Guttman, 1983; Vamplew, 1983), the primary focus of this thesis is on the behavioural effect of competition on participants, although there is some investigation that competitor's aggression is influenced by an audience (see Study 8).

### 1.2 Tyson sinks teeth

Mike Tyson's ear bite during a 1997 heavyweight fight against Evander Holyfield created a major stir in world sport (Dahlberg, 1997). Apart from violating a venerable rule of international boxing, and marring his already dubious reputation, Tyson was left to make a formal media apology and explain the brutal attack. Tyson provided an apology, "Evander, I am sorry. You are a champion and I respect that", but his explanation was far from satisfactory or informative, "I just snapped" (Dahlberg, 1997, p. 33).

Reasons as to why Tyson 'snapped' remain, in light of his vacuous explanation, a matter for academic surmise. One plausible explanation is that the intensity of the competitive situation led Tyson to aggress unlawfully against Holyfield, not thinking about the consequences of his actions. That is, the context of being in a highly competitive situation increased the probability of all forms of aggressive behaviours, including the unlawful ear bite.

Examples of outbursts of aggressive behaviour have been witnessed across a diverse number of sports, and are not restricted to violent sports such as boxing. Walker (1980), a former American Olympian sailor, once wrote:

Skippers who feel threatened may occasionally proceed from shouting to fighting.
One Long Island Sound Soling sailor leaped from a competitor's boat to take a swing at him after a port-starboard incident. (His anger was cooled when he slipped ignomoniously and fell into the water.) One American skipper started a fist fight with his crew when in the 1964 Olympics a mistake on the final leg of the seventh race cost him a silver medal. Patrick Pym attracted official attention when, with his paddle, he cracked the hand of a competitor who was pushing his Finn backward at the starting line. Charlie Morgan floored Stan Leibel as he stepped ashore from a race in which he had dismasted Charlie's Star. (p. 104)

Sailing is not a sport that entails the utilisation of aggressive behaviour as an acceptable method for winning. However, Walker's anecdotes suggest that aggression can occur when an event is fought for high stakes, and a competitor faces or experiences defeat. Smith (1983) writes about a number of isolated sporting incidents in which a player has received serious injuries from 'unsporting' aggressive acts. In 1965, a San Francisco Giant's batter felled the Dodger's catcher with his bat following an acrimonious verbal exchange; a Houston Rocket basketballer suffered serious injuries when punched by a Laker's player during a 1979 match; and, finally, Paul Smithers was convicted of manslaughter after killing an opposing player in a fight, after the game, in a parking lot of a Toronto arena. Like sailing, none of these sports are aggressive by nature, nor were the inflicted injuries by competitors unintentional or accidental. A weakness of using Walker's experience and Smith's historical accounts as evidence to strengthen the competition-aggression link is based on the academic adage that many anecdotes do not constitute evidence.

The competition-aggression link is also a phenomenon that people talk about. Jones (1996) conducted a discourse analytic study examining the way in which university students talk about the effects of contemporary media such as television, film, and videogames. She found that some participants believed that competition was created by humanity as a means of venting primal urges such as aggression. That is, competition has become a substitute for evolutionary redundant behaviours. A corollary of this belief is that aggression may occur during competition when social sanctions, such as rules or laws, are overpowered by the innate impulses derived from our ancestry. Similarly, Lorenz (1963) argued that aggression is an innate tendency that has been sublimated by the development of sport. However, notions of an innate origin of aggression, and a corollary thesis called 'catharsis' (i.e., the Ancient Greek concept that emotional tendencies can be purged from the soul), have been heavily criticised (see Storr, 1968, for a brief summary of the literature) and are not supported by available evidence (Feshbach, 1956; Mallick \& McCandless, 1966).

If commonsense (based on observation, personal experience, discourse, and academic conjecture) was an accepted scientific method, then the competition-aggression link would be
a valid empirical phenomenon. However, Anderson, Deuser, and DeNeve (1995) write: "Demonology as a social theory of aberrant behavior was a widely held belief, but the belief failed to prove either the existence of demons or their role in mental illness" (p. 434). It is evident from this quote that causal links derived from commonsense can be erroneous, and thus systematic studies are required to test the validity of the proposed phenomenon.

Hence, the following thesis is a systematic examination of the notion that competition is linked to human aggression. The methodology employed to explore this proposed link was derived from Anderson and Morrow (1995).

### 1.3 Structure of this thesis

To address the idea of the competition-aggression link, this thesis is divided into two major sections. The first of these sections (Chapters 2 to 4 ) is based on literature from the aggression field, whilst the second section (Chapters 5 to 6) constitutes evidence surrounding the competition-aggression link which was derived from experimental studies conducted by the author.

Chapter 2 provides a brief exploration of a number of conceptual issues surrounding the independent and dependent variables used in this thesis. This conceptual analysis is divided into the independent variables (competition/cooperation), the dependent variables (anger, hostility, and aggressive behaviour), and the construct utilised in Chapters 5 and 6 that represents aggressive behaviour, viz, the 'kill ratio'. There is an attempt in this chapter to provide a robust conceptual underpinning for the terms used in subsequent chapters. This was considered as an important step since the aggression field has been frequently criticised for being conceptually underdeveloped.

Following from the conceptual analysis of Chapter 2, is a review of literature on the competition-aggression link (i.e., Chapter 3). This chapter provides a comprehensive outline of literature relevant to the hypothesis that competition leads to aggressive behaviour, and the contextual and situational factors that mediate this supposed link. The literature review is restricted to empirical evidence. A number of scientific methodological and statistical criteria were employed when reviewing each study with an attempt to evaluate the relative strength and weaknesses of these findings. Gaps in current knowledge are highlighted.

Chapter 4 is a brief examination of plausible theories underpinning the competitionaggression link. Two theories are identified as the most plausible explanations of the supposed link. These theories are based on a model derived from the general aggression field. Once again, gaps in current knowledge are highlighted. An overview of Chapters 2 to 4 provides a number of broad conclusions that establish a research agenda for the studies reported in Chapters 5 and 6.

The second major section of this chapter begins with a series of studies employing similar methods to that utilised by Anderson and Morrow (1995). Study 1 from Chapter 5 reports the first empirical data obtained in this project. This study involved a sample of adolescents completing a survey on videogame use, and their perceptions of competitive and cooperative situations (particularly with respect to aggressive behaviour). Study 1 primarily examined whether adolescents perceived competitive situations as more aggressive than cooperative situations. In contrast, Studies 2 to 4 were experiments that investigated the relationship between competitive/cooperative situations and aggressive videogame play. Adolescent pairs played a videogame under a competitive or cooperative situation, and their aggressive videogame play was recorded. All studies from Chapter 5 provided estimates of each sample's videogame experience across a number of different settings (e.g., arcade, at home, and at a friend's house).

The next series of studies reported in Chapter 6 were driven by the failure to demonstrate the competition-aggression link during Studys 2 to 4 . Study 5 , like Study 1 , was a survey design, except the participants were a self-selected sample of Mortal Kombat players (all
males) who competed in Studies 6 to 8 . The aim of Study 6 was to demonstrate the competition-aggression link using a self-selected sample of Mortal Kombat players under two levels of competition, viz, a trial period and a tournament situation. Competitors were playing for prizes during the tournament situation and were competing in the presence of an audience. Study 7 was a systematic replication of Study 6 insofar as an identical method was employed except for the exclusion of the monetary rewards. Study 8 was an experimental investigation of the causal influence of an audience on competitive aggression during Study 6. Study 8 used a competitive situation outside of a tournament-type setting. Finally, Study 9 concerns the validation of the Mortal Kombat 'kill ratio' construct that supposedly represents aggressive behaviour.

The final chapter of this thesis (Chapter 7) provides an integrated summary of the findings from both sections. General conclusions are reached about the competition-aggression link, and recommendations for future research and intervention programs are suggested in the final sections.

### 1.4 Conceptualising the competition-aggression link

The purpose of the current investigation is to evaluate the idea that higher levels of competition increase the probability of aggressive behaviours (and that cooperation mitigates the link between competition and aggression). Videogame play is used as a measure of aggression. That is, aggressive behaviour (as measured by videogame play) increases during a competitive situation. It is presumptuous, however, to claim that the effect generalises to all competitive situations for all types of people and aggressive behaviours. The generalisability of the competition-aggression link is an empirical issue.

A potentially profitable way of conceptualising the competition-aggression link for the purposes of the present research is to represent the experimental effect as an interplay of three sets of factors (see Figure 1.1). ${ }^{1}$ These three factors are the Person (i.e., individual), the Setting (i.e., competitive situation), and the Media (i.e., videogames). Person factors are characteristics of the sample e.g., age, sex, culture, and socio-economic status. Media factors constitute the underlying characteristics of the videogame e.g., violent content, diagetic effects (i.e., tendency to absorb the attentional capacity of the player), and quality of graphics and sound. Setting is the type of competitive (or cooperative) situation that participants are confronted with during the experiment. In theory, when the researcher constructs a method to investigate the competition-aggression link (using videogame play as aggressive behaviour), the parameters of these three components are established. It is suggested that competitive aggression is demonstrated when the three circles overlap to a large extent (see Figure 1.1a). However, if the circles fail to overlap, because the experimenter has not manipulated these variable sets sufficiently (see Figure 1.1b), then the probability of demonstrating the competition-aggression link tends to fall away.

The purpose of this thesis is to identify those factors that maximise the probability of demonstrating the competition-aggression link. Chapter 3 is a literature review which evaluates past research in order to derive a set of statements about the factors that maximise the probability of finding an experimental effect (and where gaps in current knowledge exist). Since most studies have not used a videogame to demonstrate the link, the competitionaggression link is more broadly conceptualised as the overlap between only two components, viz, the individual and the setting. The task employed during experimentation is encapsulated under the setting factor.

[^1]

FIGURE 1.1: Diagrammatic conceptualisation of the competition-aggression link for the experimental situation as an interplay of Person, Setting, and Media, factors

In an ideal experimental world, the competition-aggression link would have a high degree of generalisability which would suggest that all competitive situations have the power to induce aggressive behaviour across a diverse set of sample characteristics and tasks. However, the 'real world' of scientific inquiry will probably return a picture in which only certain types of competitive situations (e.g., tournaments) will induce some aggressive behaviours (e.g., physical aggression) in certain types of people (i.e., high trait aggressive individuals). The likelihood of demonstrating the link will probably fall when using a different set of parameters.

It must be mentioned that psychological experimentation may show that some factors are powerful enough to yield an effect regardless of the remaining parameters. For example, Figure 1.1c shows that some competitive situations (e.g., a tournament with money rewards) may prove to be extremely powerful and cause the components to overlap. Thus, an effect will be demonstrated using this competitive situation regardless of the videogame and/or type of participants utilised during experimentation. Likewise, some personality types may be aggressive during an experiment, regardless of the competitive situation or utilised task. Again, the relative power of individual factors and sets of factors, and their interactive effects, is an empirical issue.

### 1.5 Summary

The competition-aggression link is the idea that competitive situations lead to or cause aggressive behaviours, and is based on observation and anecdotal evidence. This thesis will systematically analyse literature on this topic with the objective of establishing a research basis for the studies reported in subsequent chapters. The competition-aggression link represents a cognitive-behavioural phenomenon about which little is known.

## CHAPTER 2

## Definitions, Concepts, and Constructs

### 2.1 Introduction

Smedslund (1994) characterised contemporary psychology as a "highly sophisticated technology of data gathering and analysis, and a very low level of conceptual analysis" (p. 280). Concepts in psychology are usually poorly defined with researchers often making imprecise theoretical propositions (Smedslund, 1997). Research endeavours that do not define concepts systematically can lead to the utilisation of unreliable and/or invalid constructs. When constructs are dubious with respect to their reliability, it is difficult to determine whether the collected data are the result of manipulations of the independent variable, an unreliable construct, or both. When constructs are dubious with respect to their validity, it is difficult to say whether instruments are actually measuring what the researcher assumes they are measuring. Consequently, it is important to define the concepts utilised within this thesis (e.g., 'competition', 'aggression') in a systematic manner. Section 2.2 discusses concepts associated with the independent variable, viz, 'competition' and


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'cooperation'. Section 2.3 examines concepts which constitute the dependent variables, viz, 'anger', 'hostility', and 'aggression'. Each section not only defines these common scientific concepts but also places them within a typological framework. Finally, Section 2.4 discusses the innovative construct utilised in the current thesis (i.e., 'kill ratio') which is a measure of participants' aggression.


### 2.2 Cooperation, competition, and conflict

Deutsch (1949a, 1973) has provided the most comprehensive conceptualisation of cooperation and competition. Deutsch conceptualises competition and cooperation along the dimension of 'goal interrelatedness' i.e., the relationship between participants' goals. He writes that "in a cooperative situation the goals are so linked that everybody 'sinks or swims' together, while in the competitive situation if one swims, the other must sink" (Deutsch, 1973, p. 20). Deutsch then expands on this statement by saying:

I have defined a cooperative situation as one in which the goals of the participants are so linked that any participant can attain his goal if, and only if, the others with whom he is linked can attain their goals. The term promotive interdependence has been used to characterize all goal linkages in which there is a positive correlation between the attainments of the linked participants. The degree of promotive interdependence refers to the amount of positive correlation; it can vary in value from 0 to +1. (Deutsch, 1973, p. 20)

In an extreme cooperative situation (i.e., +1 ), participants' goals are perfectly positively correlated to the extent that if a participant progresses towards his or her goal, then all other participants within that cooperative group progress equally as a direct consequence of the first
participant's behaviour. This situation will be referred to as a cooperative situation of 'perfect promotive interdependence'. Situations of a lesser value than +1 will be referred to as 'imperfect promotive interdependence'.

In contrast, in a competitive situation:

The goals for the participants are contriently interdependent. Contrient interdependence is the condition in which participants are so linked together that there is a negative correlation between their goal attainments. The degree of contrient interdependence refers to the amount of negative correlation; it can vary in value from 0 to -1 . In the limiting case of pure competition, a participant can attain his goal if, and only if, the others with whom he is linked cannot attain their goals. (Deutsch, 1973, p. 20)

In an extrème competitive situation (i.e., -1), participants' goals are perfectly negatively correlated to the extent that if a participant progresses towards his or her goal, then other participants digress from their goals by an equal amount. ${ }^{1}$ This situation will be referred to as a competitive situation of 'perfect contrient interdependence'. Situations of a lesser value than -1 will be referred to as 'imperfect contrient interdependence'.

Furthermore, Deutsch (1949a, 1973) notes that it is extremely rare for situations to be purely competitive or cooperative in the 'real world'. Most 'real world' situations entail a complex set of goals and underlying subgoals. For example, players in a football team cooperate in order to win a match, but may also compete against each other to score more goals or to be the best player on match day. 'Real world' situations like the previous example are plentiful. Notwithstanding this point, Deutsch (1949a, 1973) argues that little extrapolation is probably required to predict the outcomes of impure situations from the empirically supported concepts of competition and cooperation reported by Deutsch (1949b).

[^2]Deutsch (1973) also contends that the concept of competition is not the same as conflict, even though they have been used in the literature as if synonymous. Whilst competition can produce conflict, not all instances of conflict reflect competition. Conflict, as derived from a competitive situation, reflects the incompatibility of goals amongst competing individuals, parties, or factions. However, conflict can also arise during cooperative situations when goals are seemingly concordant. For example, two adolescents may agree to play a videogame as a pair, with the aim of defeating the computer program, but may disagree on what videogame character they will each play with.

Raven and Eachus (1963) observed that a number of psychological studies have reported discrepant findings within the group behaviour field. Some studies, cited by Raven and Eachus, showed that competitive groups work faster than cooperative groups, while other studies have shown the opposite effect, viz, cooperative groups work faster (e.g., Grossack, 1954; Thomas, 1957). Raven and Eachus (1963) drew from the earlier work by Thomas (1957) when they surmised that characterising competitive and cooperative situations along a single dimension of 'goals' is an under-conceptualisation. Thomas (1957) initially wrote about a potentially influential dimension called 'task interdependence' i.e., the extent to which tasks performed by a group member are related to the tasks of the other group members. For a means-independent situation, group members perform their tasks independently of other members, whilst in the means-interdependent situation, a relationship exists between group members' tasks. For example, a production line is a series of tasks based on means-interdependence. Each member within the production line builds a component to a product which is passed onto the next group member, who, in turn, adds a component, and subsequently passes the product down the line. The first person's behaviour, of adding a component to the product, provides the means for the second person to add a further component. The degree of task interdependence then refers to the correlation between group members' tasks and can vary from 0 (complete independence) to +1 (perfect interdependence).

## TASK



Means independent

FIGURE 2.1: Schematic representation of competitive and cooperative situations along two dimensions, viz, 'goals' and 'tasks'.

Thus, in theory, all competitive and cooperative situations vary along two dimensions, viz, 'goals' and 'tasks'. Figure 2.1 displays the theoretically infinite number of competitive and cooperative situations that exist in the 'real world' when the dimensions are placed together to form a two-dimensional space. There are essentially four quadrants in this figure which represent two general types of competitive situations, and two general types of cooperative situations. These quadrants are:

Q1 (competition): Contrient goal interdependence using a means-interdependent task, Q2 (competition): Contrient goal interdependence using a means-independent task, Q3 (cooperation): Promotive goal interdependence using a means-interdependent task, Q4 (cooperation): Promotive goal interdependence using a means-independent task.

Spaces within the interior of the boundaries represent imperfect competitive and cooperative situations, whilst the four comers of the figure (i.e., P1, P2, P3, \& P4) represent perfect situations. For example, Pl is a competitive situation where there is a perfect negative correlation between participants' goals (-1), and a perfect positive correlation between participants' tasks (+1). In contrast, P4 is a cooperative situation entailing a perfect positive correlation between participants' goals ( +1 ), but no correlation between participants' tasks (0). Thus, in principle, psychological studies that attempt to demonstrate that competitive situations lead to higher aggression than cooperative situations should maximise the distance between experimental groups within this two-dimensional space, preferably within Q1 and Q4. (See paragraphs below for an explanation as to why Q 1 and Q 4 , and $\operatorname{not} \mathrm{Q} 2$ and Q 3. .)

The issue remains as to the empirical implications of these four general types of situations on social aggression and other group behaviour. Raven and Eachus (1963) wrote that aggression is less probable within Q 1 than Q 2 because the latter situation creates a special problem where the individual is competing against other group members to reach a desired goal but whose progress is influenced by the tasks of others. To take the production line example again, the second person, who is, for argument's sake, being timed by the
organisation (and subsequently compared with other assembly workers) for his/her speed in assembling components, must wait for the first person to complete his/her task. Thus, there is a conflict between competing for the fastest time against other workers in the production line (contrient interdependence), and working together to complete a product (means interdependence). Raven and Eachus have argued that interpersonal relationships deteriorate within Q2. Rocha and Rogers (1976) have demonstrated that the intensity of verbal and physical aggression is greater during interdependent competition, relative to independent competition.

On the other hand, Thomas (1957) has experimentally tested the hypothesis that Q3 leads to a higher level of anger towards other group members than Q4. Thomas demonstrated that female factory workers reported greater feelings of anger towards other group members when they had to build only two parts of a five-part miniature house, relative to participants who were requested to build all five parts of the house. That is, participants working in a 'production line' situation felt angrier towards their cooperative group members than participants who built a miniature house by themselves within a cooperative situation.

While the experimental predictions of aggression during different cooperative situations (or different competitive situations) are easy to deduce, it is much harder to determine empirical outcomes when all situations are compared. Thomas (1957) has shown that Q3 leads to greater anger than Q4 (although there are no data on 'hostility' or 'aggression'!), and Rocha and Rogers (1976) have shown that Q1 leads to greater aggression than Q2. From this analysis, it is not unreasonable to surmise that Q1 would entail a greater level of aggression than Q4. Raven and Eachus (1963) have shown that a cooperative situation entailing a means-interdependent task leads to less hostility than a competitive situation with a meansindependent task. That is, Q2 produces more hostility towards group members than Q3. Thus, it is argued that aggression is most probable within Q1, less probable within Q2, and even less probable within Q3. Aggression is least probable within Q4. Given the limited available data, it is concluded that experimental work, coupled with more solid theoretical reasoning, is required on the relationship between the aforementioned dimensions so as to
provide a better conceptual foundation for future work on different types of competitive and cooperative situations.

In sum, cooperative and competitive situations have been conceptualised along two dimensions, viz, 'goals' and 'tasks'. Experimental work examining the issue of aggression during competitive and cooperative situations must identify the type of dimension being manipulated during the methodological procedure. Research projects are best served by manipulating a single dimension at a time, whilst keeping the other dimension constant, in order to examine the precise effects of each factor, or by systematically manipulating both dimensions in order to examine their additive and interactive effects. In the absence of such a study, it is speculation to suggest that all competition or all cooperation varies along the dimensions of 'goals' and 'tasks'.

### 2.3 Anger, hostility, and aggression

The aggression field has been called a 'semantic jungle' (Bandura, 1973). Spielberger, Jacobs, Russell, and Crane (1983) have suggested that the semantic jungle has resulted from the interchangeable use of concepts such as 'anger', 'hostility', and 'aggressive behaviour', which are not synonymous in meaning. Careful examination of the literature reveals very little conceptual development in this area which may explain why these terms have been employed in different ways by academics. Geen (1976) has argued that while there is a massive amount of literature on aggression, relatively little has been devoted to devising valid and reliable dependent variables. Meta-scientific analyses of the literature have resulted in terms such as 'liberal individualism' (Fowers \& Richardson, 1993), 'disguised ideology' (Fowers \& Richardson, 1993), 'critical history' (Lubek, 1995), and 'coercive power' (Tedeschi, 1983), which collectively hover over the frail conceptual framework of the
aggression field. There have been few attempts to provide a comprehensive view of commonly used concepts in the field (e.g., Tedeschi, Smith, \& Brown, 1974).

The purpose of the current section is to provide a typology from which aggression concepts utilised in this thesis can be understood. Where possible, empirical evidence is cited to support the proposed statements, and gaps in current knowledge are highlighted.

The most basic concept in the aggression field is that of 'anger'. Like most psychological concepts, anger has been defined and studied at different levels of analysis such as an experience (Berkowitz, 1990; James, 1890), a cognitive-physiological response (Bandura, 1973; Schachter \& Singer, 1962), an expressive-motor or physiological reaction (Ekman, 1971, 1992; Levenson, Ekman, \& Friesen, 1990), or a combination of all of these components (Averill, 1982, 1983). This thesis will take the position that anger is a feeling, and, more specifically, an experience. There are two reasons why an experiential position will be taken. Firstly, it is clear from the literature that anger can be studied at different levels, with each level constituting a legitimate inquiry (Strongman, 1987). Secondly, despite the fact that anger can be studied legitimately at different levels, many researchers have opted for the experiential level because of the ease of collecting data based on self reports. The approach of using self-reported experience has led to well validated instruments (e.g., Spielberger, 1991) and sound theories (e.g., Berkowitz, 1990). Thus, it appears that the most logical level of inquiry is the experiential.
'Anger' is defined as an emotional experience "marked by subjective feelings that vary in intensity from mild annoyance or irritation to intense fury and rage" (Spielberger, 1991, p. 1). An important aspect to this definition is the lumping together of diverse experiential phenomena such as annoyance, irritation, and fury, with the implication that they only differ in terms of intensity. Some critics would disagree with this approach, arguing that annoyance, irritation, and fury, have distinct qualitative connotations, as well as different antecedents and consequences (Averill, 1982, 1983). Whilst I am not arguing that there are no distinctions between these phenomena, there is little evidence to suggest that these differences are highly important. For example, Berkowitz (1990) has shown that persons
placed under aversive circumstances have a tendency to self-report irritation, annoyance, and anger, which are highly correlated, and have the same relationships to overt behaviours. Spielberger (1991) has devised a valid and reliable inventory based on self-reports of experiential anger which are consistent with the findings reported by Berkowitz. Thus, for the sake of parsimony, anger is assumed to have a wide variety of qualities which fundamentally vary in terms of intensity.

Spielberger and his colleagues (Spielberger, 1991; Spielberger, Jacobs, Russell, \& Crane, 1983) have conceptualised the experience of anger as having two major components, viz, state and trait anger. 'State Anger' refers to the current feeling state of a human, while 'Trait Anger' is defined as:

The disposition to perceive a wide range of situations as annoying or frustrating, and the tendency to respond to such situations with more frequent elevations in state anger. Individuals high in trait anger experience state anger more often and with greater intensity than individuals low in trait anger. (Spielberger, 1991, p. 1)

Thus, a distinction is drawn between how a person is feeling currently, and their propensity to feel angry given a set of circumstances. Spielberger et al. (1983) have also conceptualised a further dimension of the anger experience called 'Anger Expression'. This dimension refers to all psychological processes surrounding the expression of anger. There are three major components to anger expression. 'Anger-out' refers to the extent to which individuals express their anger towards other people or objects in their environment (i.e., behaves aggressively when angry), 'Anger-in' refers to the extent to which individuals suppress angry feelings, while 'Anger-control' is the frequency with which individuals attempt to control the expression of anger (whether inwardly or outwardly). These scales have been validated in past research, and tend to correlate moderately. For example, people who experience anger regularly (i.e., score highly on Trait Anger), also tend to express rather than suppress their angry feelings (Spielberger, 1991).

In contrast to anger, hostility has received scant conceptual attention in the aggression field. Few definitions have been provided of hostility. Spielberger (1991) is one of the few writers to provide a definition: "Although hostility usually involves angry feelings, this concept has the connotation of a complex set of feelings and attitudes that motivate aggressive and often vindictive behavior" (p. 6). Although Spielberger has provided an intuitive definition of hostility, there is no empirical rationale as to why hostility should be defined in this way. Kaufmann (1965) noted that a large number of experiments have simply operationally defined hostility as either scores on a scale, responses of projective or completion devices, or judgements made by other persons, without any rationale or conceptual underpinning. Buss and Durkee (1957) were the first academics to reject such circular and global definitions of hostility, and they subsequently devised an inventory that attempted to capture the multi-faceted nature of the concept. The Buss-Durkee Hostility Inventory has seven scales such as irritability (the readiness to explode with negative affect at the slightest provocation), negativism (oppositional behaviour usually directed towards figures of authority), resentment (jealousy and hatred of others derived from real or fantasised mistreatment), and suspicion (projection of hostility onto others). However, the inventory reflects conceptual confusion because the scales mentioned in the last sentence, which might be agreed upon as hostile traits, are included in other scales which measure aspects of aggression i.e., verbal, physical, and indirect aggressive behaviours (Kaufmann, 1965).

Kaufmann also reports some interesting empirical relationships between hostile dispositions and aggressive behaviours that highlight the complexity of hostility. For example, Kaufmann reports a study in which high hostile subjects displayed greater leniency than low hostile subjects towards a juvenile delinquent described as a college student, but were more punitive towards the same offences committed by a door-to-door salesperson. In sum, it is reasonable to conclude that hostility is an under-developed concept in the aggression field. There is a demand for further theoretical work and research which develops the concept of hostility beyond its rudimentary status. Hostility appears to reflect deeper and more complex feelings than anger (e.g., resentment, suspicion), an array of attitudes and
beliefs (e.g., justice, pride), and a complex relationship with aggressive behaviours. However, there is no attempt here to define the precise nature of hostility (except for in a broad sense e.g., Spielberger, 1991), nor to utilise the concept in the studies reported in Chapters 5 and 6.

In contrast to 'anger' and 'hostility', 'aggression' or 'aggressive behaviour' refers to a collection of interrelated overt actions. Carlson, Marcus-Newhall, and Miller (1989) have demonstrated that diverse aggression measures are positively correlated and are influenced in the same way by a diverse set of antecedents, which implies that there is a general aggression underlying all overt actions of this kind. Aggression is contrasted with internal states such as anger and hostility. An overt action that is labelled as 'aggressive behaviour' may or may not have an underlying state of anger or hostility. Furthermore, there is no suggestion within this conceptual framework that the internal state of anger or hostility either causes or is coterminous with aggression as this is a theoretical/empirical issue (Berkowitz, 1990). The primary objective of the next section is to derive a definition of aggression and then integrate anger, hostility, and aggression, into a meaningful conceptual framework.

An early attempt to define aggression came from the frustration-aggression hypothesis proponents. Dollard et al. (1939) defined aggression as "an act whose goal response is injury to an organism (or organism surrogate)" (p. 11). Feshbach (1964) was one of the first to criticise this definition because it precludes a whole class of behaviours that aim to remove obstacles between the aggressor and a goal. It is argued that aggression does not always have, as a sole purpose, the intent to inflict injury. Harm may be incidental to the primary purpose of removing an obstacle. Feshbach called this class of behaviours 'instrumental aggression'. The conceptual notion that aggression is divided into instrumental and non-instrumental acts has received empirical support. For example, Buss $(1963,1966)$ showed that aggression is greatest when it has an instrumental value, relative to a non-instrumental value, within the widely used teacher-learner experimental procedure (otherwise known as the 'Buss aggression machine').

However, the distinction between instrumental and non-instrumental aggressive acts has been criticised by Bandura (1973) who has adopted a largely behavioural approach to the issue. Bandura has argued that the dimension of 'instrumentality' is erroneous in that:

Hostile aggression is equally instrumental except that the actions are used to produce injurious outcomes rather than to gain status, power, resources, or some other types of results. Whatever its merits, the distinction reflects differences in desired outcomes, not in instrumentality. It would therefore be more accurate to differentiate aggressive actions in terms of their functional value rather than in terms of whether or not they are instrumental. (p. 3)

Furthermore, Bandura argues that the 'instrumentality' dimension has led psychologists to focus largely on non-instrumental aggression which represents only a small number of aggressive acts displayed in the 'real world'. Most aggressive acts, writes Bandura, serve ends other than just the production of harm or injury to the victim.

Others have supported Bandura's argument (e.g., Kaufmann, 1965), and have further argued that the 'instrumentality' dimension draws research attention away from important issues such as the conditions which lead to and perpetuate aggressive behaviour (e.g., reinforcing stimuli). However, the distinction has merit with particular subject matters such as game competition. In competitive games, aggressive behaviours appear to fall into 'instrumental' acts, which, if directed to the desired outcome by the participant, increase the probability of winning, or 'non-instrumental' acts, in which the participant retaliates to a misdeed, is frustrated by defeat, or suffers a momentary loss of control. Researchers studying the competition-aggression link have utilised this conceptual distinction with empirical success (Widmeyer \& Birch, 1984). 'Instrumentality' then is re-defined primarily as the extent to which an individual utilises aggressive behaviour in order to win, and thereby secure extrinsic rewards such as money or resources, or to satisfy intrinsic rewards such as pride,
success, and/or status. Non-instrumental aggression serves only to inflict harm on the recipient without any other realistic extrinsic and/or intrinsic outcome. ${ }^{2}$

Moreover, Bandura's argument that most aggressive behaviours in the 'real world' are 'instrumental', as defined by traditional researchers, is, again, sensitive to the subject matter in question. In the present case, there is little evidence on the relative frequency of instrumental versus non-instrumental aggressive behaviours within competitive situations, and what limited evidence we have does not support Bandura's thesis. For example, Smith (1983) cites numerous legal cases of sporting incidents in which the defendant was judged as acting with the primary intention of injuring the victim. Thus, it is argued that the 'instrumentality' dimension does have academic merit when studying the competitionaggression link because it is a parsimonious concept that makes a meaningful distinction between (potentially) equally prevalent instrumental and non-instrumental aggressive behaviours.

Based on the above arguments, a rudimentary definition of aggression is: An overt action which is intended solely to inflict harm ${ }^{3}$ on an organism and/or object ('non-instrumental') or entails the infliction of harm to secure an extrinsic and/or intrinsic reward ('instrumental') with the underlying expectation by the actor that the action will have the intended effect. This definition is similar to Durkin (1995b). Since aggression is a collection of interrelated actions (Carlson et al., 1989), a number of qualifying characteristics are provided to highlight the complexity of this phenomenon. Aggression is thus characterised as:

1. Possessing either an underlying affect ('angry aggression' or 'hostile aggression') or none at all ('affectless aggression'). The presence of an underlying affect does not imply a causal influence on behaviour (see Berkowitz, 1990);

[^3]2. Either psychological or physical (Bandura, 1973). Psychological aggression is usually verbal behaviour (Buss, 1971), although there are a class of non-verbal responses such as facial expressions (e.g., frowning);
3. Having an underlying 'intention' by the actor to harm or inflict injury on the recipient (Kaufmann, 1965). Without an attribution of 'intention to harm', a judgement cannot be made as to whether, for example, an extension of an arm is exercise or an aggressive act (Kaufmann, 1965). 'Intentions' are determined by consensus (e.g., a court jury), consultation with the participant who is inferred as 'aggressing' (Tedeschi et al., 1974), or by reference to the context of the act (Bandura, 1973; Tedeschi, 1983);
4. Entailing an underlying expectation by the actor that the noxious stimuli will have their intended effect (Durkin, 1995b);
5. Having actual or potential consequences (Bandura, 1973; Kaufmann, 1965). For example, a sniper who fails to hit people with his gunfire is acting aggressively even though his actions fail to have negative consequences;
6. Either direct (e.g., punching someone in the nose who insults you) or indirect (e.g., spreading malicious rumours about a target person to third parties) (Buss, 1971); and
7. A social judgement about what constitutes acceptable and legitimate forms of aggression and what constitute unacceptable and illegitimate forms of aggression (Bandura, 1973; Tedeschi et al., 1974). ${ }^{4}$ That is, not all aggressive acts are socially unacceptable. For example, the mother who punishes her son, with a smack on the buttocks, for running onto a busy suburban road, may be labelled as acceptably aggressive. Reliable social judgements are derived by reference to indicators such as classification systems for media (e.g., film, television, and videogames), and/or from consultation with 'key informants' (e.g., judges, magistrates, police officers, teachers, social and community workers,

[^4]psychologists, psychiatrists, and parents). ${ }^{5}$ Standards are not fixed and are modified over time.

It follows from this set of statements that a rudimentary typology of aggressive behaviours can be formulated. All aggressive behaviours vary along two dimensions under this typology. The first dimension reflects the level and type of affect underlying the aggressive behaviour (i.e., anger, hostility, or no affect). Put another way, aggression can be performed with an underlying angry or hostile state, or can be 'affectless' (a term used by Anderson \& Morrow, 1995). The second dimension reflects the 'instrumental' level of the aggressive act i.e., 'instrumental' or 'non-instrumental'. Thus, all aggressive behaviours can be placed into one of six categories which vary along two dimensions, viz, 'affect' and 'instrumentality'. Future research should investigate the relative frequencies of each type of aggressive behaviour within this typological framework, and also evaluate their situational determinants and antecedents (particularly under competitive/cooperative situations).

### 2.4 Videogame play as aggressive behaviour: The 'kill ratio'

There is little doubt about the legitimacy and importance of videogame play in psychological research. Videogames have been utilised in a diverse number of clinical settings (Buckalew \& Buckalew, 1983; Gardner, 1991; Keepers, 1990; Kolko \& RickardFigueroa, 1985; Redd, Jacobsen, Die-Trill, Dermatis, McEvoy, \& Holland, 1987), and have been employed for field and laboratory explorations of psycho-physiology (Dustman, Emmerson, Steinhaus, Shearer, \& Dustman, 1992; Gwinup, Haw, \& Elias, 1983; Tumer,

[^5]Carroll, Sims, Hewitt, \& Kelly, 1986), animal behaviour (Washburn, Hopkins, \& Rumbaugh, 1990), socio-culture (Surrey, 1982), education (Bowman, 1982; Chafin, Maxwell, \& Thompson, 1982; Greenfield, 1984), familial interactions (Mitchell, 1985), perceptual-motor skills (Clark, Lanphear, Riddick, 1987; Gagnon, 1985; Griffith, Voloschin, Gibb, \& Bailey, 1983; Lowery \& Knirk, 1982; Subrahmanyam \& Greenfield, 1994), and psychological testing (Jones, 1984). Of particular interest for the current investigation are studies of the negative psychological and/or behavioural effects of videogames on the player (see Dill \& Dill, 1998, and Durkin, 1995a, for separate reviews of this literature).

There are a number of features of the videogame media that support its utility in psychological research. Firstly, videogames have programming characteristics which make them 'intrinsically motivating' (Malone, 1983) which probably explains their relative popularity within popular culture as an entertainment media. Secondly, videogames are ecological instruments since so many people either play them or have done so in the past (Anderson \& Morrow, 1995). This is convenient for the researcher who can therefore provide minimal instruction on the experimental task. Thirdly, Anderson and Morrow (1995) noted that videogames offer a standardised presentation of stimuli. This means that all participants will encounter the same number and type of adversaries at each respective part of the game. Fourthly, videogame play can be recorded on videotape and later examined, for example, for aggressiveness of play. There are two additional features of videogames that are highly relevant to an investigation of competitive aggression. Videogames can have cooperative and/or competitive modes which is highly convenient for investigations that compare aggression between competitive and cooperative situations. In addition, videogame play does not require true interpersonal interaction between competitors insofar as the aggressive behaviour is occurring in a simulated environment. Anderson and Morrow (1995) minimised extraneous factors during game play by placing a physical partition between participants in order to prevent pairs from interacting when they were either competing or cooperating within the videogame.

These positive characteristics of the videogame media were a chief motivation for employing videogame play as a measure of aggressive behaviour in the current research, along with the fact that Anderson and Morrow (1995) have developed a simple but powerful measure of videogame aggression called the 'kill ratio'. They operationally define the kill ratio as the total number of adversaries the player kills during videogame play, divided by the total number of adversaries that are killed and avoided. The kill ratio is a fraction that varies from 0 (non-aggressive behaviour) to 1.0 (highly aggressive behaviour). A score of 0 implies that the participant avoided all encountered adversaries, while a score of 1.0 implies that all encountered adversaries were killed. The simple definition of the kill ratio suggests that researchers can utilise this measure without undergoing extensive training.

Despite the advantages of the kill ratio derived from videogame play, a general criticism of laboratory measures is that they do not apply to 'real world' social aggression. Consequently, the validity of the kill ratio as a representation of aggressive behaviour lies in the ability to demonstrate a relationship between a sample of kill ratios and participants' 'real world' aggressive behaviours e.g., class room behaviours. A positive relationship between kill ratios and 'real world' aggression would suggest that videogame play is a representation of an individual's propensity to behave aggressively.

It is worth mentioning that the kill ratio construct is subject to operational variation because videogames differ in their programming characteristics. This claim is certainly true in the present case in which different types of videogames were utilised for Studies 2 to 4 (Super Mario Brothers, Donkey Kong Country, and Diddy's Kong Quest) and Studies 6 to 8 (Mortal Kombat series). The first set of videogames (e.g., Super Mario Brothers) are 'platform' videogames in which the player strives to reach the end of a level by either killing oncoming adversaries (e.g., jumping on their heads) or avoiding oncoming adversaries (e.g., jumping over them). The kill ratio is defined for these videogames as suggested by Anderson and Morrow (1995). Killing and avoiding oncoming adversaries are a means to an end, viz, finishing a level. In contrast, Mortal Kombat is a martial arts simulation in which two players
fight against each other using game characters. ${ }^{6}$ The players, pitted against each other, attempt to pummel their opponent's game character until one character has no energy remaining. At this point, the winning player has the choice either to kill the opponent's game character (i.e., 'Fatality'), or take mercy by offering a gift (i.e., 'Friendship') or transforming the character into a baby (i.e., 'Babality'). This final action does not impinge on the fight's outcome. Thus, a victorious player has the choice of killing or sparing the opponent's vanquished character. Unlike the first set of videogames, the kill ratio is not defined as a relative proportion of killed and avoided adversaries, but rather the proportion of characters killed or spared by the winning player. That is, 'to kill or not to kill' in the exact sense of the word.

From a logical perspective, the symbolic nature of the killing response (and subsequently the kill ratio) within Mortal Kombat has greater 'face validity' as a measure of aggressive behaviour, relative to the other videogames. The game characters are digitised pictures of 'real' people (i.e., actors), they are competing in a realistic setting (i.e., a martial arts scenario), and the killing responses are graphic depictions of death.

Interesting features of the Mortal Kombat kill ratio is that the winner performs the killing response at the end of a round in which the fight's result has already been determined. Thus, choosing to kill or spare an opponent's character is inconsequential to the fight's outcome, and is probably, by that fact, less instrumental than the killing responses in the other videogames which are a means to an end, viz, progressing through a level. ${ }^{7}$ Therefore, it is concluded that in Mortal Kombat the kill ratio is a measure of relatively non-instrumental aggressive responses, while in Super Mario Brothers, Donkey Kong Country, and Diddy's Kong Quest, it is a measure of instrumental aggression.

[^6]A limitation of the kill ratio construct (regardless of the videogame being examined) is a potential confounding set of factors related to game skill level i.e., speed, coordination, and timing. In an ideal situation, the researcher should select participants who have a high level of skill in order to reduce the influence of extraneous factors such as poor skill. However, a shortcoming of utilising experienced participants is that videogame play is likely to be stereotyped and less manipulable during an experimental situation. Another issue is the potential relationship between videogame experience and aggressiveness of play. For example, it may be that greater experience at particular videogames may increase one's propensity towards aggressive play. A sample of experienced players then would constitute a restricted range of kill ratios at baseline which would reduce the probability of finding an experimental effect. These issues were not able to be dealt with in the current research, and investigation is required to examine the influence of skill level and experience on kill ratios in order to make conclusive statements about such confounding factors.

### 2.5 Summary and Conclusions

Much of the psychological literature on aggression is characterised by poor conceptual development which can lead to imprecise theoretical statements, the utilisation of dubious constructs, and misguided empirical analyses (Smedslund, 1997; Smedslund, 1994). Thus, the primary purpose of this chapter was to define and conceptualise key terms utilised in this thesis, viz, those related to the independent and dependent variables.

The independent variable of particular interest in this research was initially defined along the dimension referred to as goal interrelatedness (see Deutsch, 1949a). Cooperation was defined as a situation in which goals were so related that a participant's behaviour increased the probability of all other participants in the group reaching the desired goal. Competition,
on the other hand, was defined as a situation in which goals were related such that a participant's or the group's behaviour took another participant or group further from their desired goal. Theoretical and empirical work subsequent to Deutsch's conceptualisation has implied a further dimension that differentiates competitive and cooperative situations. This dimension was referred to as 'task interrelatedness' i.e., the extent to which tasks performed by a group are related. Inconsistent patterns of findings within the literature were explained by past researchers' neglect of this latter dimension. Further research is required to examine the typological framework proposed in the current chapter i.e., that competition and cooperation vary along two dimensions, and to scrutinise the empirical outcomes when the dependent variable is anger, hostility, and/or aggression, as research in this area is patchy. Preliminary conclusions suggest that competitive situations, as defined by goal interrelatedness, lead to higher levels of aggression than cooperative situations, and that interrelated tasks lead to higher levels of aggression than unrelated tasks (assuming that the goal interrelatedness factor is held constant). Moreover, the effect of the 'goals' factor is stronger than the effect associated with the 'tasks' factor.

The dependent variables of the current research are based on concepts derived from the aggression field. This field is a "semantic jungle" (Bandura, 1973) precisely because commonly used terms, such as 'anger', 'hostility', and 'aggression', have been poorly defined and used interchangeably. 'Anger' has received a relatively large amount of attention by psychologists, and has been successfully conceptualised at the experiential level. Well validated instruments (e.g., State-Trait Anger Expression Inventory) have conceptualised anger by utilising self-reports, and capture the complexity of the phenomenon, viz, as a state, trait, and expressive reaction. Hostility, on the other hand, is a relatively more complex concept, and (probably because of this fact) has received little academic attention except as an operational definition. Aggressive behaviour was defined as a collection of interrelated overt actions. A complex definition of aggression was derived from the literature and is highly specific to the competitive-aggression paradigm. For example, the distinction between instrumental and non-instrumental aggression, which has been criticised by behaviourists, was
argued to be a valid concept (and of utility) when studying the competition-aggression link. Inevitably, an overt action is defined as aggression by reference to social judgements about the meaning of particular acts, their intended consequences, and their social acceptability and legitimacy. Finally, anger, hostility, and aggression, were placed within a typological framework. The framework possesses six distinct categories of overt actions which vary along two dimensions i.e., 'affect' and 'instrumentality'.

The 'kill ratio', as first developed by Anderson and Morrow (1995), is an ostensible measure of 'real world' aggressive behaviour. The kill ratio is derived from videogame play, and is defined as the total number of encountered adversaries killed divided by the total number of encountered adversaries which are killed or avoided. The kill ratio is a fraction or percentage. It was suggested that the validity of the kill ratio, as a construct of aggression, lies in demonstrating a relationship between it and 'real world' aggressive behaviour. It is emphasised that Anderson and Morrow (1995) did not validate their kill ratio formula against validated constructs of aggression e.g., teacher ratings. Thus, the validity of the kill ratio as a measure of aggression has not been empirically tested or proven. The nature of the kill ratio is sensitive to the type of videogame being utilised by the researcher (i.e., 'platform' or 'simulation' videogames).

It is concluded that research is still required in all conceptual areas of the competitionaggression field. The typologies developed for both competitive/cooperative situations, and aggression concepts, are logical and supported by some empirical evidence, but still await further work to assess their utility. In spite of these suggestions, it will be assumed for the current research that the definitions and conceptual frameworks developed in this chapter are both valid and sound, except in cases where the validation of a construct is integral to the unequivocal interpretation of the obtained data e.g., kill ratio.

## CHAPTER 3

# Psychological Literature on the Competition-Aggression <br> <br> Link 

 <br> <br> Link}

### 3.1 Introduction

The purpose of the current chapter is to provide a review of published studies on the competition-aggression link. The aim of the review is to analyse the literature using a set of scientific methodological and statistical criteria, and subsequently integrate these findings into a body of summary statements about the underlying characteristics of the competitionaggression link. To this end, relationships and contradictions will be identified in the literature, as well as highlighting gaps in current knowledge. A rigorous methodological procedure is outlined with respect to the collection and analysis of literature on the competition-aggression link. The purpose of Chapter 4 will be to provide plausible theoretical explanations for the findings presented in the current chapter.

### 3.2 Methodology

### 3.2.1 Criteria for entry

The search for research on the competition-aggression link was conducted by exploring literature databases and library catalogues. Since the data collected in this thesis are primarily quantitative, literature based on experimental and quasi-experimental methodologies were included in the review. Investigations using qualitative methods such as discourse analysis (e.g., Potter and Wetherell, 1987) or ethnography (e.g., Carspecken, 1996) were excluded from the review because of their focus on data derived from interviewing procedures. ${ }^{1}$

Studies on the competition-aggression link using non-humans were also excluded from the literature review. There were two related reasons as to why animal studies were excluded from the review. A primary reason is the conflicting results produced across species. For example, on the topic of copulatory behaviour, Shillington and Verrell (1997) found that male tarantulas were not aggressive towards each other during pre- or post-copulation with a single female tarantula, while Thor and Carr (1979) demonstrated post-copulatory aggression between male rats using a comparable methodology. The conflicting data issue is closely related to the argument that human aggression has a limited relationship with other animals. Some authors have argued that studying our evolutionary cousins (e.g., chimpanzees; see Wrangham \& Peterson, 1997) provides a scientific understanding of human aggression. However, there have been many criticisms levelled at such theses (e.g., Montagu, 1968). For example, Boulding (1968) drew the analogy that generalising the findings from animal studies to humans is like trying to understand why a jet plane flies by studying a wheelbarrow. Scott

[^7](1958) observed that aggression displayed by non-humans is almost invariably instrumental because it serves to secure an extraneous goal, whereas human aggression is probably as frequently non-instrumental as instrumental (see a discussion of this point in Section 2.3). In sum, non-human studies of the competition-aggression link have been excluded from this review because of the contradictory findings across species, as well as the evolutionary argument that human aggression is qualitatively different from animal aggression.

Finally, a large body of literature on Type A behaviour patterns (characterised as competitive and aggressive), that exhibit associations with a variety of traits such as traffic accident risk (Magnavita, Narda, Sani, \& Carbone, 1997), school achievement (KeltikangasJarvinen, 1992), coronary-risk indicators (Raikkonen, Keltikangas-Jarvinen, \& Solakivi, 1990), and impatient behaviours (Matthews \& Angulo, 1980), was also excluded from the current review because of the correlational nature of these studies. These studies generally show that persons who have a Type A behaviour pattern are at greater risk of, say, heart disease. There is infrequently, however, an attempt to demonstrate a causal link between competitive situations and aggressive behaviours.

### 3.2.2 Search process and results

References were collected if they were 'published' material or dissertations. The term 'published material' refers to any document that is accessible through refereed or peerreviewed journals, books, or book chapters, on the proposed topic. The literature databases searched were Psyclit (Psychological abstracts on CD-Rom), Medline (Database of the US National Library for Medicine), Current Contents (Database produced by the Institute for Scientific Information), and Social Sciences Citation Index. Each database was searched on a frequent basis with a final search conducted during the early months of 1999.

A standard key word trail was employed for each database in order to search for potentially relevant literature. The key word trail used across databases (except Current

Contents) was relatively short because of the programming characteristic of accepting abbreviations of key words such as competition, cooperation, aggression, hostility, and anger. The word trail was:

1. Compet* Aggress*
2. Compet* Hostil ${ }^{*}$
3. Compet* Ang*
4. Cooperat* Aggress*
5. Cooperat* Hostil*
6. Cooperat* Ang*

For the Current Contents database, abbreviations were not a part of the characteristics of the program so a larger word trail was employed to exhaust all possible combinations of the key words. This was composed of 24 entries.

Forty one independent studies were found on the competition-aggression link. Approximately half of these studies were drawn directly from the databases, whilst the other half were discovered through the reference lists of theoretical/conceptual papers (e.g., Bertilson, 1983) or from the studies collected on the competition-aggression link.

Overall, the collected studies fell into two broad types of methodologies, viz, laboratorybased and naturalistic studies. The laboratory-based studies were further divided into a general category of miscellaneous methodologies, as well as studies using Taylor's competitive reaction time procedure (see Taylor, 1967, for a lengthy description of this methodological procedure). The following review is conducted in three sections, each one representing these broad methodological categories i.e., laboratory-based miscellaneous studies, Taylor's procedure, and naturalistic studies.

It is noted that 28 studies ( $68 \%$ ) employed Taylor's reaction time procedure, 6 studies ( $15 \%$ ) were categorised as laboratory based, and 7 studies ( $17 \%$ ) employed naturalistic methodological designs. The imbalance of literature towards a single-type of methodology
has both advantages and disadvantages that will be discussed in the concluding remarks of this chapter.

### 3.2.3 Criteria for analysing the literature

Once each study was collected, it was reviewed using a set of standard scientific criteria. These criteria are:

## 1. Sound external validity:

- The sample was randomly selected and any effects of differential attrition assessed and/or controlled for;
- The sample was an adequate size;
- Testing effects were controlled for;
- Reactive effects were taken into account and/or minimised;
- The effects of multiple treatments were taken into account and/or minimised; and
- Historical circumstances were taken into account.

2. Sound internal validity:

- The validity and reliability of measuring instruments were assessed;
- The measuring instruments were appropriately utilised;
- There was a random allocation of subjects to groups;
- The problems caused by differential attrition from groups were assessed and/or minimised;
- The problems caused by testing effects (i.e., the effect of taking one test on the scores of another test) were assessed and/or minimised;
- The conclusions reached about causal relationships were warranted by the study design and data, and that alternative explanations for such relationships were proposed and adequately ruled out; and
- The potential effects of maturation, history, and/or selection, were assessed and/or minimised.


## 3. Sound statistical validity:

- The effects of statistical regression (i.e., regression to the mean) were assessed and/or minimised;
- The utilised statistical tests were appropriately applied;
- There was an adjustment of alpha levels when multiple comparisons were conducted; and
- The power of statistical tests were accounted for when drawing conclusions.

It should be emphasised that not all criteria were applicable to each study because of the nature of some methodologies.

### 3.3 Review of the literature on the competition-aggression link

### 3.3.1 Laboratory-based studies

Pioneering research on the competition-aggression link was reported by Deutsch (1949a, 1949b) who conducted doctoral work on the social psychology of groups under competitive and cooperative situations. Deutsch published his research in two papers. The first paper was a theoretical analysis of competition and cooperation, while the second paper analysed empirically the validity of the hypotheses proposed in the first paper. For the sake of thoroughness, the following review will initially consider the theoretical paper so as to provide a conceptual basis for Deutsch's subsequent experiment. It is worth mentioning from the outset that aggressive behaviour formed only a small (but important) part of Deutsch's comprehensive theory of competition and cooperation.

Deutsch's theoretical paper (1949a) attempts to sketch out a theory of competition and cooperation and then apply this theory to the functioning of small groups. He begins by reviewing a number of social theorists who have written about competition and cooperation, and draws the conclusion that there is a common thread, viz, the notion that "the difference between competition and cooperation lies in the difference in the nature of the goal-regions in the two social situations" (Deutsch, 1949a, p. 131). Deutsch subsequently provided a conceptualisation of each situation. Cooperation is defined as a social situation where "a goal-region can be entered (to some degree) by any given individual or sub-unit only if all the individuals or sub-units under consideration can also enter their respective goal-regions (to some degree)" (p. 132). In contrast, competition is defined as a social situation where:

The goal-regions for each of the individuals or sub-units in the situation are defined so that if a goal-region is entered by any individual or sub-unit ... the other individuals or sub-units will, to some degree, be unable to reach their respective goals in the social situation under consideration. (p. 132)

Deutsch acknowledged that there are probably few real-life situations which fall neatly into either of the two definitions. For example, "members of a basketball team may be cooperatively interrelated with respect to winning the game, but competitively interrelated with respect to being the 'star' of the team" (Deutsch, 1949a, p. 132), although "it is believed that in many circumstances not much theoretical extrapolation is necessary to handle the more complex situations" (p. 133).

Deutsch (1949a) then states the logical implications of his theory. For example, when talking about cooperative situations, he states that "if X locomotes in the direction of his goal, A, B, C, etc., will locomote in the direction of their goals" (Deutsch, 1949a, p. 134), and vice versa for competitive situations. Psychological implications of the theory are also stated and possess a Hullian flavour (reflecting the intellectual climate in psychology during the 1940s) e.g., "all action is a process which is directed toward reduction or removal of need-tension" (p. 137). From these logical and psychological implications, Deutsch derived hypotheses about the effects of cooperation and competition on small group functioning. A particularly salient set of hypotheses for the competition-aggression phenomenon were those pertaining to the communication style of groups. Competitive groups were hypothesised to display more aggression towards fellow members compared with cooperative groups and were also hypothesised to be less likely to reach mutual agreement on the solution of a task. The second paper tested the hypotheses proposed in Deutsch's theoretical analysis of competitive and cooperative situations.

During the experiment (Deutsch, 1949b), fifty undergraduate psychology students were randomly assigned to one of 10 experimental groups composed of five individuals each. In the first week of the study, groups were requested to solve a human relations problem during a fifty minute period. The experimenter gave each group a score based on the productivity of their discussion. Groups were paired on the basis of their productivity score. Following this procedure, one member in the pair was randomly assigned to the competitive condition, whilst the other member was assigned to the cooperative condition. All groups subsequently attended a three-hour session over six consecutive weeks. During each session, all groups
were requested initially to solve a puzzle, which had a clear-cut solution, and then provide a solution to a human-relations problem which had no right or wrong answer. Cooperative groups were told that they were being compared with four other similarly constituted groups and that each group would be ranked from 1 to 5 . Each person in the top-ranked group was said to receive an A-grade pass on a term paper. The competitive groups were told that each group member was being compared to all other members and that the same reward of an Agrade pass would be given to the top-ranked person. During each session, three to four highly-trained observers rated the groups on the basis of their communication style. Also, subjects completed a questionnaire at the end of the human relations problem drawing on their experience with other group members.

An analysis of these data revealed a consistent pattern of results across the hypotheses, suggesting a logical coherence in Deutsch's theory. For example, the cooperative groups were more likely to work together and have a higher degree of co-ordination, agree with and accept each other's ideas, and display a higher productivity rate. Most importantly for the current review was the finding that cooperative groups were more likely to encourage and be friendly towards fellow group members, and to communicate less aggressively, relative to the matched competitive groups. It should be noted that the 'friendliness' and 'encourager' variables only reached significance on the human relations problem and not on the puzzle, probably, as Deutsch suggested, because the puzzles had an obvious solution which compelled all groups to some level of agreeableness, regardless of whether they were cooperating or competing. This suggestion is supported by the finding that the competitive groups were more likely to 'block' group member's ideas on the human relations problem.

Despite confirming most hypotheses, Deutsch's experiment has shortcomings. The most obvious shortcoming was the dubious procedure of providing observers the knowledge of which were the competitive groups and which were not. Thus, the danger of these data is that they reflect the personal biases of the observers rather than representing a 'real' difference between the groups. Whilst Deutsch attempted to explain away this confounding factor, the first explanation is unconvincing: "Impromptu statements from the observers to the effect that
if they were allowed to keep the instructions in mind they would have a better interpretive frame of reference for their observations" (Deutsch, 1949b, p. 208). In reality, it is difficult to assess whether the observers were rating groups on the basis of 'real' behaviours, or whether the observers were rating groups based on expectations of what to perceive. A second shortcoming of these data was the large number of $t$-test comparisons conducted without the utilisation of a correction factor to counteract the inflation of alpha. Deutsch conducted nearly ninety $t$ tests! A Bonferroni's correction factor on ninety pair-wise comparisons would reduce the alpha level considerably, and make nearly all the reported significant comparisons insignificant. Since statistical theory in the 1940s was yet to recognise the problem of multiple comparisons, Deutsch cannot be criticised too strongly, but this still does not reduce the tentativeness of these data. Finally, another shortcoming of the paper was the failure to specify the gender of the utilised subjects.

Grossack (1954) conducted a similar study to Deutsch (1949b) by analysing undergraduates' written communication during cooperative and competitive situations. Ninety participants, who were all female, were assigned to groups of five. However, unlike Deutsch's procedure, the groups were not allowed to talk and, when led to the experimental room, were instructed to face a wall and await further instruction. Participants received one of four written instructions which induced four different types of situations, viz, high or low competition, and high or low cooperation. The cooperative instructions told participants that they were competing with other groups, while the competitive instructions told participants that they were competing with other members in their group. These instructions were highly similar to the instructions utilised by Deutsch (1949b). The high competition and high cooperation groups were delivered the additional instruction that they would receive a reward for being the top-ranked group member and top-ranked group, respectively. Following the initial instruction, participants were given an ill-structured problem about a delinquent boy which was not dissimilar to Deutsch's human relations task. Participants were requested to communicate with other group members over a four-minute period, using hand written messages, in order to provide a plausible solution to the problem. At the end of the four-
minute period, each participant was told to choose from one of seven possible solutions and write a comment about each member's contribution to the task. Participants were again requested to read the experimental instructions, whilst the experimenter swapped the comments made by participants about other group members with standardised notes. The standardised notes were handed to the participants, and, again, the group was requested to solve the same problem using the same procedure for two further four-minute periods. At the end of the third four-minute period, participants completed a post-study questionnaire. The hand-written messages of each participant for the three periods were subjected to a content analysis.

An analysis of the hand-written comments revealed a number of interesting findings. Firstly, there were no differences in the groups with respect to the reward manipulation. That is, being offered a reward had no significant differential influence on participants' comments across the competitive or cooperative situations. Secondly, cooperative participants were more likely to show cohesiveness (i.e., use words such as 'I', 'we', and 'others'), pressure group members towards uniformity, and to accept that pressure, relative to competitive participants. Finally, cooperative participants were more likely to use instrumental communication (i.e., opinion, information) and less likely to receive 'consummatory' messages (i.e., tension, antagonism), relative to participants from the competitive groups. That is, the competitive situation induced hostile communication between group members. Overall, Grossack's data are highly consistent with both the theory and research findings of the group behaviour field.

Despite the neatness of Grossack's data, there are still a number of criticisms of this study. The first criticism relates to the finding that the offered reward did not influence participant's communication. If we accept Grossack's data, this would suggest that Deutsch (1949b) demonstrated aggressive communication because of the competition/cooperation manipulation per se, rather than because he used a competitive or cooperative situation with a reward. However, the question must be asked as to whether or not the reward was salient for participants. For example, the high competition group was told that "the best group would be
rewarded" (Grossack, 1954, p. 342), but what the nature of the reward would be was not specified. Thus, the null finding of a reward may imply a lack of power in the methodology rather than the relatively low effect of a reward. A second criticism of the study is serious for the proposed finding that competition induces 'consummatory' communication. There is no mention at all throughout the paper as to the procedure employed for analysing the handwritten messages. In an unreliable scenario, the experimenter may have analysed the messages himself in which case the data would be contaminated by the experimenter's biases of demonstrating a statistical effect. This criticism is also compounded by the dubious nature of the 'consummatory' construct which supposedly represents a measure of aggression but which has no conceptual underpinning. Thus, the finding that aggression was demonstrated in the competitive condition is tentative at best. A third criticism of the study is the use of female participants only which suggests that the findings do not necessarily generalise to males. A related issue is the suggestion that the findings may not generalise to settings in which participants are allowed to interact verbally because of the social pressure to disguise criticisms and negative feelings toward others. However, Deutsch's data imply that the competition-aggression link can be demonstrated in experimental settings involving verbal interaction.

Raven and Eachus (1963) extended the generalisability of the competition-aggression link during group dynamics to motor tasks i.e., beyond verbal and written communication. The rationale for the study was based on the observation that there are discrepant findings in the group behaviour field. The most common discrepancy has been the issue of whether competitive groups work faster or slower on experimental tasks than cooperative groups. Some of the early research (e.g., Maller, 1929; Triplett, 1898; cited by Raven \& Eachus, 1963) showed that competitive groups work faster than cooperative groups (although not as efficiently), whilst relatively more recent research reveals that competitive groups actually work slower than cooperative groups (e.g., Grossack, 1954; Thomas, 1957). Raven and Eachus hypothesised that the discrepant findings are the result of an under-conceptualisation of competitive and cooperative situations (see Section 2.2 for an in-depth discussion of this
point). Deutsch (1949a, 1949b) originally conceptualised the degree of interdependency of groups solely on the basis of goals. For example, Deutsch wrote that cooperative social situations entail "promotive interdependent" goals because the movement of individuals towards a goal increases the possibility of other members reaching their goals. However, Raven and Eachus raised the point that an additional dimension of interdependence is that of means i.e., the extent to which tasks performed by individuals within a group are related to the tasks performed by the remaining group members. Raven and Eachus write that:

In the means-independent situations, subjects will use the performance of others to evaluate themselves, and motivation would be great in the competitive situation. .... In the means-interdependent situations, competition presents a special problem, since the individual is competing with an individual who affects his own progress. There is then a conflict between positive dependence and negative dependence- the subject is attempting to hinder someone who can help him. Also competition coupled with means-interdependence give each individual a threat which he can utilise with respect to the other . .. with resultant deterioration of interpersonal relationships. (p. 308)

The authors added that:

By contrast, in the means-interdependent cooperative situation, the individual is working towards a common goal with those upon whom he is dependent for his own efficient locomotion. We should expect that the difference between cooperative and competitive groups ... would be especially likely where means-interdependence is high. (p. 308)

It is highlighted at this point that Raven and Eachus have reasoned illogically. Taylor (1967) hypothesised and demonstrated that participants in a cooperative situation, who were given a means-interdependent task, reported feeling more angry towards their group members
than cooperative groups conducting a means-independent task. If we extrapolate these findings to aggression, then Raven and Eachus have made an error by saying that "we should expect that the difference between cooperative and competitive groups ... would be especially likely where means-interdependence is high" (p. 308). In fact, Taylor's data suggest that the difference between competitive and cooperative situations are highest on aggression if the competitive situation involves a means-interdependent task, and the cooperative situation involves a means-independent task! This is an interesting point when their methodology is closely examined because their competitive situation is actually means-independent, while their cooperative situation is means-interdependent. Thus, despite their best intentions, the authors designed a methodology that reduced the probability of finding an effect.

One hundred and twenty male undergraduates were randomly assigned to forty triads who were requested to participate in a motor task ostensibly designed as a nonverbal intelligence test. The apparatus used for the study was a triangular desk composed of two pieces of board. A screw was placed on each corner of the upper board, thus separating the two pieces of boards. Rotating a screw caused the table's corner to decline. Raven and Eachus conducted two manipulations. Firstly, triads were assigned either to a competitive or cooperative condition. Cooperative groups were told they were being timed to measure the speed with which they could level the board as a group across four trials. That is, the cooperative situation utilised a means-interdependent task. It was also said that each member of the fastest group would receive a book prize. Cooperative groups were told that there were nine other similarly constituted groups competing against them. Similarly, competitive participants were told that the object of the exercise was to level their edge of the board as fast as possible, but that only the fastest person in the group would be eligible for a prize, with ten individuals across all groups receiving a prize. That is, the competitive situation utilised a means-independent task. The number of groups who were competing for a prize was not disclosed to participants in the competitive condition. Secondly, the table was rendered immobile for half of the cooperative and competitive groups in order to introduce a frustration factor into the task. All participants completed a questionnaire after each trial period, as well
as a post-study questionnaire which had a hypothetical situation where participants were asked to rate the likelihood that hostility would have broken out if group members were competing for prizes of $\$ 100$, instead of book prizes.

A number of hypotheses were tested by Raven and Eachus, and the reported data mainly supported their experimental predictions. Firstly, the cooperative groups worked significantly faster than the competitive groups but their theorising about the means-interdependence factor was not confirmed because they failed to manipulate and compare all four types of scenarios. Secondly, cooperative groups evaluated their fellow group members in a more favourable manner than competitive groups. Finally, and most importantly for the proposed link, competitive groups were more likely to suggest that hostility would have broken out if participants had been competing for a $\$ 100$ prize. Interestingly, an interaction effect was found in that competitive participants with the immobile task were more likely to suggest that hostility would have broken out given a $\$ 100$ prize, relative to all other groups. That is, the combination of frustration and competition produced the greatest amount of hypothetical hostility predictions.

A strength of the Raven and Eachus study is the neat pattern of results which were highly consistent with the experimental hypotheses. Another strength is that an abstract motor task was employed which required minimal prior learning and thus eliminated the influence of extraneous factors such as personality, cultural factors, and past experience. This implies that the competition-aggression link may generalise to other tasks because it was demonstrated using an abstract motor task. In spite of these strengths, a weakness of the study was the utilisation of a very dubious measure of hostility i.e., an unvalidated and indirect measure. The authors did not attempt to validate this construct using an existing hostility measure (i.e., scale, test, or task) from the aggression field. To make matters worse, hostility is a poorly defined scientific concept (see Section 2.3 for an discussion of this claim). A more robust methodology would have entailed the utilisation of a valid and reliable measure of aggression, and preferably not hostility. In the absence of a validation study, one can only make conclusions based on behavioural tendencies, as opposed to actual behaviours.

The systematic investigation of the competition-aggression link was conducted beyond the group behaviour field when Nelson, Gelfand, and Hartmann (1969) reported a study using a social learning theory approach. The primary focus of the Nelson et al. study was to analyse the effects of competitive games and exposure to an aggressive model on children's play behaviour, as well as to evaluate gender as a confounding variable. Nelson et al. provide a clear explication of a theory as to why competition increases the occurrence of aggression:

Berkowitz (1962) has suggested that competition constitutes a frustrating situation which generates anger and which frequently results in aggressive behaviour. .... Either failure or success in competition generates frustration, although frustration is likely to be greater for the loser who has been denied the fruits of success and has endured a greater number of thwarted responses than has the winner. Nevertheless, the winner is also subjected to stress due to the unpredictability of the outcome and fear of possible defeat. Thus either failure or success should result in greater aggression than should no competition. (Nelson et al., 1969, 1085-1086)

It is noted that a theoretical explanation for the competition-aggression link, which is provided later in this chapter, is based on Berkowitz's earlier theoretical work. Nelson et al. also provide a theory as to why exposure to an aggressive model interacts with the effects of competition to increase exponentially the likelihood of aggression in children, viz, Berkowitz's cue exposure theory. The authors argue that Berkowitz's cue exposure theory (which suggests that exposure to an aggressive model arouses previously learned aggressive habits) underlies the hypothesis that observing an aggressive model, and then playing a competitive game, significantly increases the probability of aggression.

Ninety six 5- and 6-year-old children were paired into same-sex dyads and exposed to either an aggressive or non-aggressive model whilst playing with clay. The aggressive model spent three minutes attacking a Bobo clown (a procedure identical to an oft-cited study by Bandura, Ross, \& Ross, 1961). Following exposure to a particular type of model, dyads
either played various games or did not participate in competition at all. The competitive games were pre-determined so that one child would automatically win nearly all the trials, whilst the other child would automatically lose nearly all the trials, regardless of his/her performance. The games were a hand strength task and a miniature ten-pin bowling alley. The successful participant received pieces of candy twice during the hand strength task and three times during the bowling game, whilst the failing participant received one piece of candy during the hand strength task only. In addition to the candy reward, the successful participant received verbal praise during competition from the experimenter (e.g., "She is a really good bowler!"; p. 1089). Following the completion of the competitive games (and benign activity for the non-competitive play condition), dyads were separated and placed into playrooms which contained aggressive and non-aggressive toys. Participants were allowed to play for ten minutes during which time observers wrote down brief descriptions of each child's play behaviour. The descriptions were subsequently analysed into five different categories of behaviours, viz, imitative physical and verbal aggression, partial imitation, nonimitative aggression, and non-aggressive play.

An analysis of the total number of aggressive responses revealed an interaction between participant's gender and type of model. Females exposed to an aggressive model were equally likely to display aggressive behaviours as males, but were less likely than males to display aggressive behaviour when exposed to a non-aggressive model. That is, exposure to an aggressive model raised female aggression to a level displayed by males who appeared to be uninfluenced by the type of model observed. However, competition alone, or with another variable, did not significantly influence aggression, despite the mean values falling in the predicted direction. Despite this non-significant finding, the authors, who initially applied the correct statistical practice of an ANOVA on these data, proceeded erroneously to conduct multiple $t$ tests between the competition conditions (without any statistical adjustments), demonstrating differences in the predicted direction. The authors subsequently wrote at length as to why competition influences aggression when clearly these data were not demonstrating a significant result on an $F$ test. Therefore, it will be assumed that competition
did not have a significant effect on participants' aggressive behaviours. An analysis of imitative aggression only revealed a significant effect on the modelling variable.

There are four plausible reasons why Nelson et al. failed to demonstrate that children exposed to competition did not display more aggression than children not exposed to competition (or that failure participants did not display more aggression than success participants). One explanation suggests that the competitive situation entailed a meansindependent task which, as Raven and Eachus (1963) argue, reduces the probability of finding a statistical effect. In contrast, means-interdependent tasks increase the probability of demonstrating the competition-aggression link. Rocha and Rogers (1976) provide the second plausible explanation which suggests that the aggression was measured outside of the competitive setting which implies that the aggression failed to have an 'instrumental' value. This explanation suggests that the competition-aggression link is more probable when the measured aggression increases the chances of victory, as opposed to those behaviours which are inconsequential to a competitive situation's outcome. However, the evidence appears to contradict this hypothesis. For example, Sherif and Sherif $(1969,1973)$ reported a series of studies (reviewed later) demonstrating that boys on summer camp, who were divided into two groups, and competed against each in a tournament, were hostile towards each other well after the competitive activities had ended. This study suggests that the aggression or hostility induced during competition can be non-instrumental. A third competing explanation of these data suggests that there is a contextual basis for the competition-aggression link. Thus, measuring participants' aggressive behaviour outside of the competitive setting reduces the contextual cues that elicit aggression. Unlike the second explanation, scientific evidence appears to support this third explanation. To take the same study, Sherif $(1967,1972)$ showed that the hostility displayed by the boys on summer camp disappeared when they went back to their respective homes. That is, the hostility displayed during summer camp did not transfer to other settings! A final plausible explanation as suggested by Hartley (1964) is that laboratory measures of aggressive behaviour (e.g., Bobo doll aggression) are not valid indicators of social aggression. However, Johnston, DeLuca, Murtaugh, Diener (1977)
revealed that laboratory aggressive behaviour by children (i.e., Bobo doll play) correlates highly with teacher and peer ratings of aggression demonstrated at school. In sum, the third explanation (i.e., competitive aggression is setting bound) is the most plausible.

Rocha and Rogers (1976) conducted a similar study to Nelson et al. (1969) but it was better controlled. Aggressive behaviours were measured within the competitive setting, and the task was means-interdependent. These variables combined supposedly maximise the probability of demonstrating the competition-aggression link. Sixty four males aged between 6 and 7 years were the participants for this study. Participants were paired with a confederate (of approximately the same age) and were instructed to build a tower from a limited supply of blocks. The object of the exercise was to compete with the confederate in trying to build the biggest tower. The reward for building the biggest tower was displayed to pairs. Half of the pairs were shown a very attractive reward (i.e., toy gun, rocket), while the other half were shown a relatively less attractive reward (i.e., crayon, piece of candy). A further variable was the amount of blocks present for tower building. Half of the sample were provided an abundant supply of blocks ( $\mathrm{n}=100$ ), while the other half were given a limited supply of blocks ( $\mathrm{n}=13$ ). Those assigned to the limited blocks condition were placed in a meansinterdependent task, whereas those in the abundant blocks condition were in a meansindependent task by fact that the former group's building task was more conditional on the tower building of the confederate. Participants were given three minutes to build a tower while the experimenter observed from an adjoining room and videotaped the session.

To add to the complexity of the analysis, the authors measured the aggressive dispositions of a large sample of children by collecting teacher ratings on seven items before the study began proper. These items were derived from a validated scale designed by Stewart, Pitts, Craig, and Dieruf (1966). Children were placed into three categories: A high aggressive disposition, a low aggressive disposition, and a moderate aggressive disposition. A random selection of children were drawn from a school population from the high and low aggressive disposition categories, thus adding another factor to the statistical analysis.

The videotapes of the experimental sessions were scored for aggressive behaviours. Two independent observers, who were blind to the study's aims, categorised each observed aggressive act as either verbal aggression (insults, protests, and threats), interference (taking blocks from confederate's tower, toppling confederate's tower), or physical aggression (pushing, pulling, hitting, and wrestling). Each aggressive act was also rated on a 5-point scale in terms of its intensity. The intensity scores within each category of aggression were summed to form three composite scores for each participant. The authors wrote: "This scoring system yielded, for example, a higher interference aggression score for the single act of completely demolishing a tower than for the single act of taking one block from a tower" (Rocha \& Rogers, 1976, p. 591).

A multivariate ANOVA showed three main effects (and no interactions) when the three types of aggressive behaviours were linearly combined. That is, the limited blocks group produced higher mean aggression (on the linear composite of the three types of aggression) relative to the abundant blocks group; the attractive prizes produced higher mean aggression relative to the unattractive prizes; and high aggressive participants displayed more competitive aggression than low aggressive participants. A series of univariate ANOVAs revealed a significant difference on each type of aggression (i.e., verbal, physical, and interference) for each independent variable. For example, participants presented with an attractive reward produced a higher score on verbal aggression than participants presented with an unattractive reward, as they did for physical aggression and interference. The mean difference scores across all the comparisons were quite large with a range of 4.2 to 11.4. It should be noted, however, that it is difficult to ascertain the exact amount of aggressive acts displayed for each type of category, and their respective intensities, because the authors only presented the mean composite scores i.e., the sum total of all aggressive intensity scores.

In conclusion, Rocha and Rogers (1976) have presented a number of interesting findings. They have elegantly shown that several factors are a sufficient (but not a necessary) condition to produce increases in several types of competitive aggression, viz, verbal and physical aggression, and interference behaviour. Raven and Eachus (1963) argued that aggression is
more probable during competitive situations entailing a means-interdependent task. Rocha and Rogers' data support this hypothesis. Deutsch (1949b) alluded to the importance of a reward, while Grossack (1954) reported data which contradicted this hypothesis. Rocha and Rogers have shown that the reward is an important influence in its own right. Finally, evidence from the violent television field shows that individuals with high aggressive dispositions are more likely to behave aggressively in particular contexts (i.e., after watching violent television) than individuals with low aggressive dispositions (e.g., Bushman, 1995). Rocha and Roger's data also appear to show that personality factors mediate the link between competition and aggressive behaviour.

A major strength of Rocha and Rogers' study was the adequate validation of the utilised instruments. Rocha and Rogers interviewed a sample of twelve 6-7 year old boys and requested them to state preferred rewards. They also interviewed faculty and staff members on what they thought children's preferences might be with respect to rewards. A common response was that the rocket and gun were more attractive rewards than the crayon or piece of candy. Further on this point was the high internal consistency of the disposition for aggression scale ( $\alpha=88$ ). Finally, inter-rater reliability analyses of scores for observed aggression during tower building were very high. Another strength of the paper was the utilisation of appropriate statistical analyses, viz, multivariate ANOVA for multiple and related dependent variables.

In contrast, it is much harder to detect weaknesses in this study. One criticism relates to the procedure utilised by the experimenters to score the videotapes. Even though the independent observers were blind to the aims of the study they could have easily deduced that the number of blocks was an experimental manipulation, especially given the observers were "two graduate students" (Rocha \& Rogers, 1976, p. 591). The authors discounted this potential weakness by saying: "the raters had no idea what significance, if any, the number of blocks had" (p. 591), but this explanation is far from convincing. Despite this weakness, it appears unlikely that the number of blocks influenced observer's scoring because it cannot explain why the other two variables had independent influences over the three dependent
variables in exactly the same way as the blocks factor. A second criticism of this study is that the sample size of 64 participants reduced the power of finding interaction effects between the independent variables. For 2-way interactions, there were four independent groups which equates with only 16 participants per cell. For a three-way interaction the situation is even worse with eight independent groups and only eight participants per cell. Thus, the small sample size may have manufactured a statistical scenario where the factors had independent influences when, in reality, interactions may have been found if the sample size was larger.

The final study in this category was reported by Anderson and Morrow (1995) who employed an innovative methodological framework to the competition-aggression link. Since the methodological procedures of Anderson and Morrow have been largely duplicated in this thesis, a comprehensive critique of the paper is conducted in this section. The aim of this critique is to highlight strengths and shortcomings of their findings.

The introductory section by Anderson and Morrow (1995) clearly articulates the rationale of the research program. Violence is identified as a social issue in US society: "Our violent crime rate is considerably higher than that of any other major Western nation, as shown by the 1990 murder and serious assault rates" (p. 1020). Statistics are reported to validate this assertion, as well as indicating the type of violence most commonly recorded:

In 1990, of murders for which the circumstances were known, $45 \%$ were classified as being due to arguments. Another 26\% were classified as "miscellaneous non-felony types", a category that includes murders committed "during brawls while the offender was under the influence of alcohol and/or narcotics." (p. 1020)

The authors then propose that competition may promote arguments, anger, and/or aggression, and cite relevant research conducted on the topic (e.g., Nelson et al., 1969; Sherif \& Sherif, 1953). Reference is made to the idea that competition is linked with aggression: "When people perceive that they are competing with each other over a valued commodity,
they naturally behave in ways that produce ill feelings, arguments, and (occasionally) physical conflicts" (p. 1021). And that the putative connection has a social origin:

At a fairly early age, then, most people learn to think of competitive situations in hostile, aggressive terms and to think of cooperative situations in friendly, nonaggressive terms. We develop rich knowledge structures about competitive and cooperative situations. These knowledge structures guide our perceptions and behavior as we enter new situations. (p. 1021)

The proposed hypothesis that competition and aggression compose a knowledge structure or schema is developed further when the authors suggest that (in theory):

This knowledge structure approach to competitive aggression does not require true interpersonal interaction in order to produce aggressive behavior. The main thesis of this article is that simply defining a situation as competitive (vs. cooperative) is sufficient in many circumstances to produce significant increases in aggressive behavior. The main circumstance in which this is likely to occur is when the situation is ambiguous along two dimensions. First, the situation must be ambiguous with regard to how much aggression is called for. .... Second, the situation must be relatively novel. (p. 1022)

To that end, it was suggested that a videogame is an appropriate task to show the competitionaggression link because it is novel and standardised. Moreover, the authors argued that the utilisation of a videogame provides a contribution to the debate on the negative effects of violent media, and that the competition-aggression link is a unique media effect which has not been studied as yet: "No studies have explicitly manipulated competitive versus cooperative instructions for the same task and then followed up by assessing purely cognitive-based (i.e., in the absence of dynamic interaction) aggressive behavior in that task context" ( p .1023 ).

Subsequent to these introductory statements, the authors report two experiments on the competition-aggression link. Experiment 1 is less relevant to the issue of whether competition leads to aggression because it is not a true experimental design (i.e., where a variable is manipulated and another is observed). Rather, a survey study was conducted to test the underlying assumption that humans perceive competitive situations as aggressive, and cooperative situations as non-aggressive. The first experiment sought to tap both the competition and cooperation schemas by administering a number of paper-and-pencil tests to seventeen university students. The authors hypothesised that university participants would perceive competitive situations as more aggressive than cooperative situations because of the semantic link between competition and aggression in human memory. On the whole, the hypotheses were supported by these data. For example, on one test, participants were requested to think of competitive situations they had encountered in the past and write words that described those situations. Participants also had to think about cooperative situations and write words to describe those situations as well. An analysis of these data revealed that participants wrote a significantly greater number of aggressive words and a significantly lesser number of non-aggressive words to describe competitive situations when compared with responses of cooperative situations.

However, a limitation of this study is that causal explanations are difficult to derive from survey data. An alternative explanation of these data is that participants provided responses that reflect demand characteristics as opposed to underlying schemas. A true test of the competition-aggression link would entail manipulating a situation along the competition/ cooperation dimension and examining the effects of such a manipulation on behaviour. Anderson and Morrow's second study served this end. Moreover, a shortcoming of the first study was the small sample ( $n=17$ ) which rendered the employed statistical tests ( $F$ tests) as potentially unreliable.

During Experiment 2, 60 university students were paired and assigned to either a competitive or a cooperative condition. Participants either played separate games (i.e.,
competitive group) or the same game (i.e., cooperative group). Participants were placed into either same- or mixed-sex dyads. The utilised videogame was Super Mario Brothers, c. 1987 .

Paired participants in the competitive group were instructed to play the doubles version of Super Mario Brothers which entails playing separate games. When the first player dies or completes a level, the second player automatically begins his or her game, and when the second player dies or completes a level, the first player resumes his or her game. Participants were told that their performance (i.e., how far they travelled in the first scenario) would be compared against their opponent. In contrast, paired participants in the cooperative group were told to play the singles version of Super Mario Brothers. When the first participant died or completed a level, he or she was instructed to pass the joy-pad to the second participant who continued playing the same game. Participants were requested to travel as far as possible in the first scenario. Game play was taped on a video recorder for both groups.

The dependent measure (which represents aggression) was the 'kill ratio' (see Section 2.4 for a full description of the kill ratio). The kill ratio is defined as the number of encountered videogame adversaries the participant kills divided by the total number of adversaries encountered (i.e., killed plus avoided). It was hypothesised that the competitive group would display a higher kill ratio because their competition-aggression schema would be primed by the situation, while cooperative participants would avoid more encountered adversary because the cooperation schema would be primed.

An analysis of these data supported the hypothesis that competition would increase aggressive videogame play. Participants in the competitive group had a significantly higher kill ratio ( $\mathrm{M}=.66$ ) when compared with the cooperative group $(\mathrm{M}=.41)$. From a theoretical perspective, an enlightening finding was that the aggression demonstrated by the competitive group was not accompanied by greater levels of reported hostility (i.e., the aggression was affectless) because they were no more hostile after the playing period (as measured by the State Hostility Scale; Anderson et al., 1995) than those in the cooperative group. That is, the authors found evidence supporting a purely cognitive basis for the competition-aggression link (see the next chapter for a full explanation of the cognitive theory).

Despite the neat findings reported by Anderson and Morrow, the second study has shortcomings that render these data tentative. A major shortcoming of this study was the failure to validate the kill ratio as a measure of aggressive behaviour. This criticism is particularly compelling when you consider that the experimental videogame (e.g., Super Mario Brothers) probably does not even have face validity for aggressive behaviour. ${ }^{2}$ To validate the kill ratio, Anderson and Morrow could have correlated the sample of kill ratios with each subject's propensity for aggressive behaviour as determined by an independent validated test, instrument, or task.

The apparent failure to examine (or test) the kill ratio construct as a valid measure of aggression is compounded by the ambiguity as to whether the cooperative situation caused the cooperative subjects to decrease their tendency to kill adversary, or whether the competitive situation caused the competitive subjects to increase their tendency to kill adversary, or whether both effects took place. This point leads one to beg the question: If a baseline measure had been recorded, would we have still observed any changes across the groups? The authors final comment of "we leave the task of teasing apart the relative effects of competitive and cooperative instructions to future research" (p. 1028) leaves the reader with more questions than answers.

Moreover, the uncertainty of these findings is heightened by the additional shortcoming that the study failed to collect data on the extent to which competitive and cooperative subjects were competing against their opponent during the experimental session. Without these data, one cannot even conclude that the subjects' perceptions of the competitive and cooperative situations were consistent with the authors' experimental instructions.

In sum, Anderson and Morrow reported data supporting the cognitive theory of the competition-aggression link by showing that participants in a competitive videogame situation killed more encountered adversary than participants in a cooperative situation, and that the

[^8]displayed aggression occurred in the absence of hostility. However, the failure to validate the dependent measure raise doubts about the theoretical implications of these findings. It is concluded that further studies with validation procedures are required in order to replicate these findings.

### 3.3.2 Taylor's competitive reaction time procedure

## Introduction

Twenty eight studies were discovered using Taylor's reaction time procedure with a diverse number of topics analysed under this experimental paradigm. Twelve studies (43\%) examined the effects on aggressive behaviour of individual differences such as hostility (Ohbuchi, 1982; Taylor, 1967), social desirability (Taylor, 1970), anxiety (Dengerink, 1971), depression (Dengerink \& Myers, 1977), locus of control (Dengerink, O'Leary, \& Kasner, 1975), Machiavellianism (Gaebelein, 1973a), field independence-dependence (Dengerink et al., 1975), and gender (Hoppe, 1979; Shortell \& Biller, 1970; Taylor \& Epstein, 1967). Thirteen studies (46\%) were focussed on situational factors that mediate competitive aggression such as monetary rewards for winning (Gaebelein \& Taylor, 1971), monetary rewards for reducing or increasing shock levels (Borden, Bowen, \& Taylor, 1971; Pisano \& Taylor, 1971), a non-compliant third party (Gaebelein, 1973a, 1973b; Gaebelein \& Hay, 1975), counter-aggression from the opponent (Dengerink \& Bertilson, 1974; Kimble, Fitz, \& Onorad, 1977; Pisano \& Taylor, 1971), belief similarity of the opponent (Hendrick \& Taylor, 1971), degree of defeat (Epstein \& Taylor, 1967; Shortell, Epstein, \& Taylor, 1970), and audience presence (Borden \& Taylor, 1973). Finally, three studies (11\%) were on the topic of formulating methods for reducing competitive aggression (Dengerink \& Bertilson, 1974; Kimble et al., 1977; Pisano \& Taylor, 1971). The sections that follow this introduction
constitute a review of literature based on Taylor's reaction time procedure. The first part of the review is devoted to research on individual differences, the second part is on research of situational factors, and the third part is on research that explores techniques for reducing competitive aggression. It is noted that each personality study has almost invariably incorporated a situational factor into the methodological design and thus consideration will be given to the overlap of findings across these sets of studies.

It should also be noted that a number of additional studies were discovered on the effects of alcohol (e.g., Giancola \& Zeichner, 1995; Zeichner, Allen, Giancola, \& Lating, 1994) and other drugs (e.g., Gantner \& Taylor, 1988; Weisman, Berman, \& Taylor, 1998) on competitive aggression, however, these studies were excluded from the review because they focus on the behavioural consequences of depressant drugs (with the findings applicable to a clinical setting), rather than being concerned with the adverse effects of being intoxicated during a competitive situation. These studies were excluded from the review for the additional reason that Taylor's procedure may produce invalid results when subjects are intoxicated with alcohol and/or other drugs. ${ }^{3}$

It is beneficial to outline the basic structure of Taylor's procedure because the methodology is largely invariant across all the reported studies. During the initial stages of the study, the subject was led to believe that (s)he was competing on a reaction time task with another student who is in an adjoining room. The subject sat down and concentric shock electrodes (as described by Tursky, Watson, \& O'Connell, 1965) were placed on the inner surface of the left forearm using Tursky's standardised procedure (Tursky, 1974). Following these procedures, a series of increasing shocks were administered to the subject and (s)he was instructed to inform the experimenter when they became 'definitely unpleasant'. At this

[^9]point, the administration of shock was terminated and the experiment began. Dengerink and Bertilson (1974) provide a concise description of the experimental task:

The task instructions were then presented via tape recorder. The subject was told that he would be competing with an opponent in a reaction time contest. At the beginning of each trial, both the subject and the opponent were to press a button to set the shock intensity each wished to give the other if the other should have the slower reaction time on that particular trial. (p. 257)

They further describe that:

There were five different shock intensities that could be delivered to the subject and that the subject could set for the opponent. The number 5 shock and the number 5 feedback light were described as corresponding to the intensity judged as definitely unpleasant during the pretrial threshold phase. The remaining intensities (four, three, two, and one) corresponded to percentages of the maximum, $90 \%, 80 \%, 70 \%$, and 60\%, respectively. (p. 257)

Once the subject set a shock level, to be delivered to the opponent in the event that the subject had a faster reaction time, the trial began:


#### Abstract

When the press signal occurred, the subject was to press the reaction time key and to hold it down until the release signal occurred. At this latter signal both the subject and the opponent were to release the reaction time key as rapidly as possible. The subject was then informed that within a short time after releasing the reaction time key, a light would be illuminated to indicate what intensity the opponent had set for him. Further, the subject was told that if his reaction time was longer than that of this opponent he


would receive a shock of the intensity indicated by the feedback light. The duration of each event within a trial (set, press, release, and feedback) was 10 sec . (p. 257)

However, there was no opponent in the adjoining room. The subject was competing against a bogus opponent and the experimenter pre-determined the number of trials that the subject would win (usually $50 \%$ ), and the shock intensities of the opponent. The reaction time procedure was conducted in blocks of six trials where the subject usually won 3 trials within each block. Unless otherwise stated, it will be assumed for each reviewed study that the author(s) pre-programmed the subject to win $50 \%$ of all trials. There were always an odd number of trials (e.g., 25) because the first trial was a baseline measure of the subject's propensity for aggressive behaviour (since the first trial came after the initial shock setting).

Taylor's reaction time procedure is unique to the field because electric shock is delivered to the losing competitor during a reaction time task, instead of the winning competitor receiving a reward. Put another way, the winner avoids an aversive stimulus instead of receiving a reward. Some commentators may argue that this type of competitive situation is highly contrived and does not resemble the nature of competition in the 'real world'. However, there are two arguments against this position. Firstly, Taylor's reaction time task does not have to resemble a 'real' competitive situation if subjects are treating the situation as serious competition. Berkowitz and Donnerstein (1983) first articulated this thesis when they cogently argued that aggression studies still have external validity if the experimental situation is 'real' to the subjects, regardless of whether the setting resembles the 'real world'. Shortell et al. (1970) reported that the procedure elicits a competitive streak in subjects:

> This situation produces such a high degree of ego involvement, that subjects often pound on the table in anger or curse their unseen opponents out loud. Some have pleaded for an opportunity for a return engagement with an opponent they believe treated them badly and have stated they would gladly forego the usual experimental credits if their request would only be granted. (p. 313)

Dengerink (1971) also observed the same types of behaviours: "Both the verbal and physical behavior of Ss indicated that the procedures had been effective in both deceiving and provoking them. Subjects clinched their fists, pounded on the table, giggled, muttered, and cursed at their opponents" (p. 225). Thus, Taylor's reaction time procedure has 'experimental realism' i.e., the task was treated seriously by subjects (see Carlsmith, Ellsworth, \& Aronson, 1976, for a more detailed definition of 'experimental realism').

Secondly, even if it could be argued that Taylor's procedure does not have 'experimental realism', it probably still has 'mundane realism' for a number of reasons. ${ }^{4}$ For example, some (if not all) competitive situations entail the losing competitor confronting an aversive experience e.g., loss of pride, popularity, or fame, or a failure to acquire an extrinsic reward. Thus, if competition entails an aversive experience for the loser then the only factor absent from Taylor's procedure, that would make it a simulated 'competitive' situation, is the reward.

The mundane realism point is strengthened by Shortell et al.'s (1970) rationale that:

While there have been a large number of studies of laboratory-induced aggression ... , there has been no investigation of exchanges of physical punishment. Yet, this is one of the most basic aggressive interactions in everyday life, corresponding to a fistfight where individuals are concerned, and to warfare where nations are involved. (p. 313)

There is some evidence that competitive aggression involves the reciprocation of aggressive behaviour amongst professional players. Widmeyer and Birch (1984) have argued that professional ice hockey players reciprocate aggression when they showed that losing competitors retaliated, during the latter part of a match, against the instrumental aggression performed by the winning competitors performed at the start of the match. That is, 'real' competition involves the reciprocation of aggression between competing teams.

In sum, Taylor's reaction time procedure engages the subject in a competitive task, and probably resembles 'real' competition because the winner avoids an aversive stimulus and there is evidence from field studies that professional players reciprocate aggression during matches. In spite of these arguments, a validation study is still required to show that the aggression of electric shock under this paradigm is a valid and reliable measure of 'real' aggressive behaviour. This is an empirical issue that will be further discussed in a later section.

## Personality, Individual, and Gender, Differences

Taylor (1967) conducted one of the earliest studies examining individual differences in aggressive responding under Taylor's reaction time procedure. To that end, Taylor was interested in the extent to which shock settings are influenced by tendencies to inhibit hostile behaviours (as measured by a hostile behaviour inventory). He hypothesised that shock settings would be higher amongst individuals who are less likely to inhibit hostile aggression (i.e., undercontrollers) relative to individuals who are more likely to inhibit hostile impulses (i.e., overcontrollers). Experimental subjects were selected from a sample of 183 male undergraduates who completed a self-rating inventory of hostile behaviours (as developed by Saltz; cited by Taylor, 1967). The self-rating inventory has two scales, viz, Undercontrolled Hostility Scale, and the Overcontrolled Hostility Scale. Eleven subjects were selected from the screening sample because they attained the highest scores on the Undercontrolled Hostility Scale and scored below the median on the Overcontrolled Hostility Scale (i.e., Undercontrollers, UC), whilst another 11 subjects were selected because they attained the highest scores on the Overcontrolled Hostility Scale and scored below the median on the Undercontrolled Hostility Scale (i.e., Overcontrollers, OC). Taylor also reported a control group composed of 11 subjects who scored below the median on both scales.

[^10]Taylor (1967) also investigated the interaction between these personality types and the effects of increasing provocation from the bogus opponent. There were 25 trials overall i.e., four blocks of 6 trials with an initial baseline measure. The opponent's shock settings were pre-set by the experimenter to increase across these four blocks. The average shock set during the first block was 1.5 , the average during the second block was 2.5 , then 3.5 for the third block, and, finally, 4.5 for the last block. It was hypothesised that:

1. Aggression would increase as a direct function of provocation,
2. UC group would have a higher gradient of aggressive behaviours, across the trials, as a function of provocation than the OC group,
3. Physiological arousal would vary directly as a function of aggressive provocation, and
4. Physiological arousal would increase more rapidly and asymptote higher as a function of aggressive provocation in the OC group relative to the UC group.

An ANOVA test using the within-subjects factor of provocation (i.e., shock settings of opponent across blocks of trials) and between-subjects factor of personality type revealed that the latter factor influenced subjects' shock settings. A Duncan Multiple Range test showed that the UC group was significantly more aggressive than the remaining two groups that did not differ from each other. A within-subjects effect revealed that increased provocation across the trials led to higher aggression. The interaction effect between the personality groups and the provocation factor was not significant. Taylor (1967) then proceeded to eliminate the control group from further statistical analyses (which were identical to the procedures just reported) because it was argued that the error variability was inflated by the control group by fact that it was the least homogenous with respect to the selection criteria. The results showed an interaction effect at the 5\% level between the UC and OC groups and provocation level. The UC group increased settings at an increasing rate across the trials, while the OC group increased shock levels at a decreasing rate. Moreover, the UC group was
more likely to match the opponent's aggression at higher levels of provocation relative to the OC group. In sum, these data supported Hypotheses 1 and 2.

An analysis of skin conductance revealed that physiological arousal varied positively with aggressive provocation. Hypothesis 3 was supported by these data, however, there was no interaction between provocation and groups. That is, Hypothesis 4 was not supported by these data. However, when an ANOVA was conducted excluding the control group, the main effect was no longer significant (i.e., UC and OC groups did not differ with respect to skin conductance) but there was an interaction between groups and level of provocation. As the experimental session progressed, and provocation from the opponent rose, physiological arousal from the UC group continually increased, while that of the OC group showed very little change. This finding contradicted Hypothesis 4. As a consequence of this finding, Taylor (1967) concluded that:

It is often assumed that an increase in physiological tension follows the inhibition of an aggressive impulse. .... Contrary to expectation, the overcontrollers produced a less steep gradient of physiological arousal than the undercontrollers. The results suggest that the view that the inhibition of aggression produces a rise in tension requires re-examination and may be less generally true than is usually believed. ( $p$. 308)

In sum, Taylor (1967) has demonstrated that some personality types (i.e., Undercontrollers) are conducive to retaliating with relatively higher levels of aggression when an opponent delivers increasing levels of shock over a series of trials. Taylor's study highlights the importance of hostile propensities in predicting the pattern of competitive aggression. His study also implies that the effect is strongest amongst individuals who have little compunction towards expressing aggression when provoked during competition. A major shortcoming of this study was the somewhat dubious elimination of the control group from the final statistical analyses.

Following from his earlier study, Taylor (1970) investigated the relationship between the personality type of socially desirable responding and competitive aggression. He wrote: "In recent years, numerous researchers have hypothesised a relationship between approval motivation (social desirability responding) and the expression of aggression" (p. 195), and a number of theorists were cited who acknowledge the role of approval motivation in the expression of aggression. For example, Fishman (1965) wrote: "The direct expression of aggression against others has strong negative sanctions in American middle-class culture and tends to provoke disapproval and rejection. We might, therefore, expect that an individual strongly motivated toward gaining approval would tend to inhibit such unacceptable behavior" (p. 809).

Thirty subjects were selected for this study from a total of 200 undergraduate males who completed the validated Marlowe-Crowne Social Desirability (MC-SD) scale. Ten subjects were randomly selected from those who attained the highest scores on the MC-SD scale (HIGH NEED), 10 subjects were randomly selected from those who attained the lowest score on the MC-SD scale (LOW NEED), and 10 subjects were randomly selected from those who scored around the mid-point of the MC-SD (CONTROL). Each subject competed over 29 trials (the first trial, of course, being the baseline measure). The first block consisted of four trials where the opponent set the minimal shock level i.e., Number 1 ; the second block consisted of 6 trials where the opponent set an average shock level of 1.5 ; the third block consisted, again, of 6 trials but the mean shock setting was now 2.5; the fourth block contained 6 trials, again, but the mean shock level rose once again to 3.5 ; and, finally, the fifth block contained 6 trials with the average shock level being 4.5. That is, subjects were faced with an opponent who increased provocation across the trials.

Analysis of these data showed that the LOW NEED group set a higher level of shock ( $\mathrm{M}=3.0$ ) during the first block, when the opponent produced minimal shock settings, than the HIGH NEED (1.8) or CONTROL (1.6) groups. There was also an interaction effect between the remaining four blocks of trials and the approval motivation factor. Whilst the HIGH NEED and CONTROL groups increased shock levels across the trials (as a function of
increasing attack from the opponent), the LOW NEED group responding in a highly aggressive manner across all levels of attack. In addition, Taylor (1970) found that the CONTROL group responded with the same mean shock settings during the final block as the LOW NEED GROUP ( $M=3.5$ ), but the HIGH NEED group set significantly lower shock ( $\mathrm{M}=2.7$ ). Taylor concluded that:

The high need-for-approval Ss were less aggressive than the low need-for-approval Ss. However, the difference between the groups appears to be due to the inappropriately aggressive behavior of the low need-for-approval group rather than the inhibition of aggression on the part of the high need-for-approval group. The high need-forapproval Ss appeared to be responsive to the opponents' provocation. (p. 196)

Taylor further explains that the high need-for-approval subjects set low shock in the initial stages in order to coax the opponent towards submissive responding, but were increasingly confronted with a conflict situation as this strategy failed i.e., the opponent increased provocation. He wrote:

One might expect the approval-oriented individual to search for and conform to an external standard of comparison or model. In other words, he might conform to the behavior of the opponent. ... In a less ambiguous situation, for example, one in which intense aggression is rewarded, the high need-for-approval $S$ might behave in a more aggressive manner. (p. 196).

However, what is less clear is why the LOW NEED group responded consistently with high levels of shock, despite the minimal settings of the opponent during the initial stages of the competitive reaction time trials. Taylor argued that the LOW NEED individual is relatively free of social anxiety and thus responds in a "naive" manner during competition in order to "make the game more interesting". Informal discussions with LOW NEED subjects showed
that many enjoyed playing the game and beating the opponent, and were more insensitive to the negative consequences of their actions. The hypothesis that Taylor's subjects were "relatively free of social anxiety" leads us to Dengerink (1971) who tested the hypothesis that aggressive individuals under the competitive reaction time task are lower on social anxiety.

Dengerink (1971) cited a number of studies from the general aggression field and within Taylor's paradigm that demonstrate a relationship between an inhibition of aggression and an anticipation for punishment (or fear of disapproval). Thus, he hypothesised "that persons who differ in anxiety will differ in aggression" such that "persons who report themselves to be anxious would be less aggressive in a competitive aggression situation than persons who report themselves to be relatively nonanxious" (p. 223). A potential interactive factor to the anxiety dimension is the influence of monetary rewards on aggression. Based on clinical literature, Dengerink further hypothesised that the facilitative effects of monetary rewards on aggression would be greatest for low anxious subjects.

Subjects for the study were selected from approximately 500 undergraduate males who completed Lykken's (1957) well-validated 32-item anxiety scale. Twenty subjects were selected for the original pool of undergraduates because they scored in the first quartile of the total score distribution (HIGH-ANX), and another 20 subjects were selected because they scored in the fourth quartile of the total score distribution (LOW-ANX). Subjects competed in four 6-trial blocks i.e., 24 trials plus an initial baseline measure. Provocation from the opponent increased during the trials from 1.5 in the first block to 4.5 in the fourth block (as described by Taylor, 1967). Half of the subjects from both the HIGH-ANX and LOW-ANX groups were offered a monetary reward for setting higher shock levels on any given trial. Subjects were told they would receive $1 \notin$ for setting a Number 1 shock, $2 \phi$ for a Number 2 shock, $3 \not \subset$ for a Number 3 shock, and so on. Thus, this study contained two between-subjects factors (anxiety disposition and monetary reward), and a within-subjects factor (provocation).

An analysis of baseline shock settings showed that the LOW-ANX group set significantly higher shocks ( $\mathrm{M}=3.0$ ) than the HIGH-ANX group ( $\mathrm{M}=2.2$ ), and that the monetary reward caused the MONEY group to be more aggressive $(\mathrm{M}=3.1)$, than the NO-MONEY group
$(\mathrm{M}=1.5)$. An examination of the remaining trials revealed an interaction between blocks and anxiety groups. The HIGH-ANX group displayed a gradual increase in shock settings across the trials, and the LOW-ANX group also displayed an increase in shock (albeit to a lesser extent). The LOW-ANX group set significantly higher shock during the first three blocks, but was matched by the HIGH-ANX group during the final 6 -trials block. Rewarded subjects continued after the baseline measure to set higher shock ( $M=3.4$ ) than unrewarded subjects ( $M=2.7$ ). An interaction was also observed between shock settings during win/loss trials across the blocks. Subjects in all groups tended to show a progressive tendency across the trials to behave more aggressively after losing than winning.

These findings support the hypotheses of Dengerink (1971) and Taylor (1970) that low anxious individuals behave more aggressively during competition than high anxious individuals, although there is the caveat that "during the final block when provocation was maximal, high anxious Ss were no longer less aggressive. It thus appears that differences in aggressive behaviour of high and low anxious persons may vary as a function of the degree of attack" (p. 229). A strength of Dengerink's paper is the consideration for alternative explanations (i.e., that high anxious subjects were more aggressive during greater provocation because they habituated faster to shock than low anxious subjects), which are explained away by examining the pattern of physiological measures. Whilst the monetary reward had an independent influence on aggressive responding, the hypothesis that there would be an interaction effect between the money and anxiety factors was not supported by the findings (not surprisingly, as there were only 10 subjects per cell).

Dengerink et al. (1975) examined a further two personality factors (viz, locus of control and field dependence) in two separate studies using Taylor's competitive reaction time procedure. The authors noted that behaviourists, such as Buss (1961), have tended to focus on reinforcers (such as the termination of attack) as causal explanations for counteraggression, and cited relevant research to support this argument (e.g., Hokanson, Willers, \& Koropsak, 1968). However, in the wave of the cognitive revolution, Dengerink et al. drew from Rotter (1966) and Bandura (1973) who have argued that the actual consequences of
aggressive behaviour are not as important than the expectations regarding these consequences. That is, individuals who expect their aggression to influence the attacker's aggressive responding (e.g., Internal Locus of Control, or Internals) are more likely to behave aggressively than those who expect their behaviours to have little influence on the attacker (e.g., External Locus of Control, or Externals). Internals are described as having a general expectation that events occur as a function of their behaviour, rather than as a function of luck or chance, whilst Externals have generalised expectations of having little influence over events (Rotter, 1966). Dengerink et al. (1975; Study 1) tested the notion that Internals would behave more aggressively towards attack than Externals.

Consistent with other studies on personality factors, subjects were appropriately screened before the study began proper. The Locus of Control Scale, as developed by Rotter (1966), was administered to 210 undergraduate males, and 30 male subjects were then randomly selected from those who scored below the $30^{\text {th }}$ percentile (Internals), whilst another 30 subjects were selected from those who scored above the $70^{\text {th }}$ percentile on the distribution (Externals). An additional between-subjects factor was also incorporated into the methodology to examine the influence of different types of opponents on Internals and Externals. Ten subjects from both the Internal and External groups were randomly assigned to confront either an opponent who increased shock settings across the 25 trials (INCREASE), an opponent that decreased shock settings across the trials (DECREASE), or a constant opponent who set consistent shock of Number 3 across the trials (CONSTANT). Shock settings were pre-determined in a manner described by Dengerink et al. (1975). That is, the INCREASE group was confronted with an opponent who set an average of 1.5 during the first 6 -trials block, whilst the DECREASE group had an opponent who set 4.5 during the first 6trials block. During the second 6 -trials block, the INCREASE group's opponent raised shock to an average of 2.5 , while the DECREASE group's opponent decreased shock to 3.5 . And so forth. In addition, there were two within-subjects factors, viz, subjects' shock settings after a win/loss trial, as well as the blocks factor.

Analyses of these data revealed a number of interaction effects. An interaction between opponent type and blocks showed that the DECREASE group reduced shock settings across the blocks, the INCREASE group raised shock across the trials, and the CONSTANT group kept shock at a constant and moderate level ( $\mathrm{M}=3.0$ ). These findings support the conclusions reached by O'Leary and Dengerink (1973) that the intensity of immediately preceding attack is a major predictor of a subject's aggressive behaviour. Moreover, there was an interaction between type of opponent, blocks, and Locus of Control. While the Externals mirrored the Internals such that they demonstrated shock settings as described above, the pattern was more consistent for the latter group. For example, during the second 6-trials block, the Externals set approximately 3.0 against the DECREASE opponent, whilst the Internals were more likely to match the opponent by setting 3.5. Furthermore, during the first two blocks, Internals set significantly lower shock against the INCREASE opponent than the DECREASE or CONSTANT opponents, but these differences were not observed amongst Externals i.e., the INCREASE and DECREASE conditions did not differ in shock level. On the basis of these findings, Dengerink et al. (1975) concluded that:


#### Abstract

The Internal group thus appeared to adopt a reciprocating strategy of setting high shocks for high shocks and low for low. Relative to the Internals, the Externals in general appeared to act as though they were helpless in the face of an opponent who was choosing shock for them. (p. 196)


During the second study, Dengerink et al. (1975) examined the field dependence-field independence personality dimension as developed by Witken, Dyk, Faterson, Goodenough, and Karp (1962). Field-dependent persons are described by Witken et al. (1962) as relying heavily on external cues (e.g., other individuals) for definitions of appropriate social behaviour. Dengerink et al. cited research in which mothers of field-dependent children were more likely to punish their offspring for aggressive behaviours and were more inconsistent in doing so. The authors predicted that:

[^11]The procedures underlying this study were identical to Study 1 except for the screening instrument. The Hidden Figures test (Jackson, Messick, \& Myers, 1964), for the field dependence-field independence trait, was administered to 120 undergraduates from which 30 males were randomly selected from those who scored below the $30^{\text {th }}$ percentile (F-DEP), and a further 30 males were randomly selected from those who scored above the $70^{\text {th }}$ percentile (F-INDEP).

Preliminary data analyses from Study 2 showed that, like Study 1, there were no initial differences between the personality groups on the baseline measure (i.e., before the first reaction time task). Interestingly, the findings were consistent with Study 1 in that an interaction was found between attack and blocks. There was also an interaction between attack and personality type. Post-hoc comparisons showed that the field-independent subjects set more intense shock in the DECREASE condition ( $\mathrm{M}=3.6$ ) than against an INCREASE $(\mathrm{M}=2.6)$ or CONSTANT ( $\mathrm{M}=2.4$ ) opponent. These differences were not observed for the field-dependent subjects. Furthermore, field-dependent subjects set less intense shock $(M=2.7)$ than the field-independent subjects $(M=3.6)$ in the DECREASE condition. In contrast to Study 1, there was no interaction effect between attack, personality type, and blocks. Dengerink et al. (1975) concluded that: "The differences in aggressive behavior between field-dependent and independent subjects was dependent upon certain characteristics of the Decreasing condition and not upon high intensity attack per se" (p. 198), since the INCREASE opponent failed to produce differences between the personality groups during the final trials where attack reached a maximum level. These findings are consistent with the notion that field-dependent individuals rely on external cues for socially appropriate
behaviours because they were less likely to set high shock when their opponent attacked with 'unjustified' provocation.

A major conclusion from Dengerink et al.'s (1975) study is that the relationship between attack and aggressive behaviour is moderated by individual differences in personality. However, a weakness of this article is the absence of theoretical implications of these findings. Another weakness was the separation of the studies that prevented a larger analysis examining the interaction between locus of control and field dependence dimensions. It would have been interesting to assess the empirical relationship between these theories because the personality dimensions have some commonalities. Finally, a major shortcoming of Study 2 was the low number of subjects in each cell $(\mathrm{n}=10)$ when the 3 -way interaction was conducted between attack, personality, and blocks, which decreased the probability of finding a significant 3 -way effect. With a larger number of subjects, an interaction effect may have been found consistent with Study 1, although this point is based on the assumption that the population effect sizes are larger for the Locus of Control factor than the field dependence factor (thus warranting a larger sample size).

In the introductory statements, Dengerink and Myers (1977) raise the argument that Dengerink et al.'s (1975; Study 1) findings can be explained by a 'learned helplessness' effect, instead of a personality difference on the Locus of Control scale. However, it is must be stressed that notions of learned helplessness, as developed by Seligman and his colleagues (Hiroto \& Seligman, 1975; Seligman, 1975), which suggests that people who repeatedly experience uncontrollable aversive consequences have a reduced desire to terminate subsequent aversive events, is not unlike the notion of a trait where people believe they cannot control behavioural consequences (i.e, Externals). In fact, the environmental circumstances that promote learned helplessness may create and feed into a belief system associated with an external locus of control. Therefore, whilst Dengerink and Myers raise a legitimate argument about the situational basis of the locus of control trait, the suggestion that Internals and Externals behaved differently in Dengerink et al.'s study because of different situational experiences has little methodological basis as both groups received the same
experimental procedures. The pre-assessed personality difference is the only explanation for Dengerink et al.'s data. However, this does not preclude a situational explanation for the development of the external locus of control trait.

Given the idea that learned helplessness causes individuals to act less aggressively under attack or provocation, Dengerink and Myers (1977; Experiment 1) report a study where males experience either repeated failure or repeated success and then compete within Taylor's reaction time procedure with an opponent who escalates shock settings across trials. Twenty undergraduate male volunteers were randomly assigned to either a success or failure group. Following the establishment of shock thresholds within Taylor's procedure, the SUCCESS group was administered 15 single-solution anagrams to solve in 15 minutes (where each anagram was easily solved). In contrast, the FAILURE group were given the same 15 anagrams but each solution was extremely difficult (i.e., the letters were highly scrambled). A preliminary analysis of the number of solved anagrams showed that the FAILURE group solved an average of 2.3 anagrams, whilst the SUCCESS group solved 9.6 anagrams. Ratings made by subjects about the difficulty of the task provided further evidence that the experimental anagram manipulation had the desired effect on each group. Subjects subsequently competed within Taylor's reaction time task. There were 25 trials and the opponent's shock settings increased across the blocks as described by Taylor (1967).

Preliminary analyses showed no systematic differences between the SUCCESS and FAILURE groups on the baseline measure of aggression. Further analyses produced findings consistent with the learned helplessness theory in that FAILURE subjects were less likely to increase shock settings (relative to SUCCESS subjects) when confronted with increasing provocation from the opponent. Post-comparison tests showed that the SUCCESS group chose significantly higher levels of shock from one block of trials to the next, whilst the FAILURE group did not increase shock across any blocks. Furthermore, analyses showed that the SUCCESS group set significantly higher shock than the FAILURE group on the final block of trials.

While other studies reviewed here have focussed on personality differences, Dengerink and Myers (1977; Experiment 1) focussed on a situational factor i.e., learned helplessness. This provides a foundation to the second experiment on the effects of depressive dispositions on competitive aggression. The authors stated that:

The effects of leamed helplessness (lowered initiation of voluntary responses, interference with leaming, negative cognitive set, lowered libido and appetite) are quite similar to those symptoms reported to be common among depressed persons (Beck, 1967). Such a similarity has led Seligman (1975) to suggest that learned helplessness may be an appropriate model for reactive depression. Insofar as repeated failures experienced by subjects in the first experiment are an adequate manipulation of learned helplessness, and if learned helplessness is a satisfactory model of aggression, then it may be appropriate to predict that depressed individuals will evidence smaller increments in aggressive intensity than would nondepressed persons. (p. 91)

The authors subsequently cited studies showing that persons with high depressive dispositions tend to behave more aggressively. They also refer to Seligman (1975) who has pointed out that a non-depressive disposition immunises the individual from the effects of repeated failure (thus implying a potential confound between personality type and the experimental procedure). Thus, Dengerink and Myers (1977) conducted a study where they pre-selected individuals on depressive disposition, as well as incorporate a failure/success factor in the methodological design. Dengerink and Myers predicted that "repeated failure would result in smaller increments in aggressive intensity to increasing attack than would prior success" and that "this effect would be greater for depressed than for nondepressed persons" (p. 92).

Forty undergraduate males ( 20 depressed and 20 non-depressed individuals) were selected from 650 students who completed Beck's (1967) Depression Inventory. The procedure was identical to Experiment 1 except that the repeated failure manipulation was accomplished by
using a cognitive task employed by Hiroto and Seligman (1975). Again, preliminary analyses showed that the experimental manipulation of failure/success had the desired effect on each group, and that the groups did not differ on baseline settings. Furthermore, statistical analyses showed a 3-way interaction between blocks, failure, and depressive disposition. All groups significantly increased shock across the trials under increasing provocation from the opponent, however, the increment was greatest amongst nondepressed-failure subjects ( $M=1.8$ ), moderate amongst depressed-success and nondepressed-success groups ( $M=1.1$ ), and smallest amongst the depressed-failure subjects ( $\mathrm{M}=0.6$ ). Newman-Keuls tests indicated that depressed persons experienced prior failure chose less intense shock during the last block than those who experienced prior success. When the analyses were conducted within the FAILURE condition, nondepressed subjects chose significantly more intense shock than depressed subjects (for the final two blocks), whilst in the SUCCESS condition, the nondepressed subjects did not differ on any block when compared with the depressed subjects. Thus, the predictions of Dengerink and Myers (1977), that depressed subjects would set less intense shock than nondepressed subjects during maximum provocation, was supported by the findings, but only when the depressed subjects failed at a previous task. Furthermore, the idea that prior failure leads to lower shock towards increasing provocation from the opponent was only true for depressed subjects since nondepressed subjects tended to set higher shock if exposed to repeated failure than when exposed to repeated success. This latter finding supported the inclusion of the personality factor of depression in the methodological design.

A strength of this paper is the endeavour to explain the findings across Experiments 1 and 2 (e.g., why did repeated failure amongst nondepressed persons cause higher levels of aggression in Experiment 2?), and the acknowledgment that "it is quite possible that different effects of repeated failure and depression would be observed for subjects such as females" (p. 95). A weakness of this article is the inappropriate criticism of Dengerink et al. (1975) (i.e., that they confounded a personality trait with a methodological procedure), and then the apparent irony of demonstrating an interaction between depression (a personality trait) and the
methodological procedure of Experiment 2. Dengerink and Myers (1977) have demonstrated that situational circumstances interact with personality in a complex manner, particularly when aggression is being performed under increasing provocation during a competitive situation.

Merrick and Taylor (1970) examined the nature of competitive aggression with respect to the personality trait of achievement motivation. It should be emphasised that a shortcoming of this paper was the weak rationale for examining this personality factor: "While the possibility of a relationship between these variables has never been empirically explored, it has been suggested by much of the work done in this area ... "(p. 203). This point is strengthened by the reported null findings.

Four hundred male university students were administered an achievement motivation scale. Thirty students who scored the highest on the scale were assigned to the high achievers group (HI-ACH), whilst 30 students who scored the lowest on the scale were assigned to the low achievers group (LO-ACH). Another variable was placed in the methodology, viz, degree of defeat. Subjects from both groups were randomly assigned to either a high defeat condition (i.e., received five shocks every six trials), moderate defeat condition (i.e., received three shocks every six trials), and the low defeat condition (i.e., received one shock every six trials). All subjects competed on 25 reaction time trials, and the opponent increased provocation from 1.5 during the first block of six trials, to 4.5 during the last block of six trials.

An analysis of these data showed that shock set by subjects increased across the blocks as a result of increasing provocation from the opponent. As predicted, there was an interaction between blocks (or level of attack) and degree of defeat with aggression increasing most rapidly in the moderate defeat group. The achievement motivation variable had no influence on aggression either by itself or in combination with other factors. Despite discussing why the degree of defeat factor interacted with increasing provocation from the opponent, there was little discussion by Merrick and Taylor (1970) on why the achievement motivation factor was not related to aggressive behaviour.

Ohbuchi (1982) conducted an interesting study on the effects of highly negative experiences on subject's retaliative responses during Taylor's procedure. Ohbuchi tested the phenomenon referred to as 'negativity bias in attribution' i.e., the notion that negatively valenced information is given more weight than positively valenced information. This hypothesis was tested by administering shock with either a wide or narrow range of shock intensities (with the average level of shock held constant across the groups). It was argued that if subjects interpret intense shock (particularly high levels) as an important indication of the opponent's intent, then they are likely to retaliate more aggressively against the opponent using a wide range of shocks than when the opponent uses a narrow range of shocks. Following from Ohbuchi (1979), it was hypothesised that negativity bias would be greatest amongst hostile subjects. It is noted that this is the only personality study under Taylor's procedure that utilised female subjects.

Fifty-two female university students were selected for this study on the basis of their score on the Japanese version of the Buss-Durkee Inventory. Twenty six subjects were classified as hostile, whilst the remaining 26 subjects were classified as nonhostile. Subjects were informed at the outset that they would be competing against a female opponent. Each subject competed on 20 trials during a pre-session, and 40 trials in a test session. During the presession, all subjects received an average shock of 3.0 from the opponent. However, during the test session, both subject types were randomly assigned to a wide range (WIDE) or a narrow range (NARROW) condition. The NARROW condition entailed subjects receiving shock settings between 2 and 4, while the WIDE condition entailed subjects receiving shock settings between 1 and 5 . Subjects were requested to rate the opponent's malicious intent using bi-polar adjectives.

Preliminary analyses of these data showed that pre-session shock settings did not vary as a function of shock range, hostility, or an interaction of these factors. An analysis of the test sessions showed that the shock range factor was significant, as well as the hostility main effect. Subjects in the WIDE group set higher shock than those in the NARROW group, and subjects were more aggressive if they had a hostile disposition. However, there was no
significant interaction between these factors. In addition, the WIDE group tended to rate the opponent as significantly more malicious than the NARROW group. The authors concluded that: "negativity bias in attribution affected the subject's retaliation regardless of whether she was hostile or not" (p. 52).

A strength of this paper was the consideration of plausible alternative explanations other than negativity bias. A limitation of this study was the use of females only. An interaction effect between hostility and shock range is yet to be tested amongst males. In addition, the apparent failure to find an interaction between hostility and shock range may be explained by the low number of subjects per cell $(\mathrm{n}=13)$ for this analysis.

Drawing from Milgram's obedience studies (e.g., Milgram, 1963, 1965), Gaebelein (1973a) observed a paucity of research on the behaviour of leaders, with previous studies exploring the behavioural influence on subjects of an authority figure. This apparent bias in the literature led Gaebelein to conduct a study based on a modified version of Taylor's procedure in which the subject was to advise a confederate on the shock intensity to be delivered to a bogus opponent. Put another way, Gaebelein was looking at the effects of a disobedient/obedient confederate on the behaviour of the subject in an authority figure role. A personality factor was also incorporated into the design, viz, Machiavellianism, as well as a monetary reward for instigations.

One hundred and eighty three male undergraduates completed Christie's Machiavellianism Scale which measures an individual's tendency to manipulate others for personal gain (Christie \& Geis, 1968). Forty males from this original sample were selected because they attained the highest scores on the scale, whilst another 40 males were selected because they attained the lowest scores on this scale.

Two persons (the subject and a male confederate) were led into the experimental room and told that they would be competing on a reaction time task against two males in the adjoining room. The subject and confederate were requested to draw slips of paper to determine the adviser. Unbeknownst to the subject was the fact that both slips had 'adviser' written on them. The subject (i.e., the adviser) and the confederate were sat down and shock electrodes
were attached to each person. The confederate's shock electrodes were inoperative. After the 'definitely unpleasant' threshold was determined for both individuals, the subject's electrode was removed from his wrist. The subject was then instructed to advise the confederate before each trial on a suggested shock level, whilst the task of the confederate was to concentrate primarily on competing against the bogus opponent on the reaction time task. There were a total of 28 trials: one block of 4 trials, and four blocks of 6 trials.

A number of experimental manipulations were conducted. Firstly, the personality factor of Machiavellianism (HI- and LO-MACH groups). Secondly, half of the HI-MACH subjects, and half of the LO-MACH subjects, were awarded more money for higher shock settings (i.e., $1 \phi$ for setting a Number 1 shock, $2 \phi$ for a Number 2 shock, $3 \phi$ for a Number 3 shock, etc.; see Dengerink, 1971, for a description of this procedure). Thirdly, the confederate across the HIand LO-MACH groups either complied with the subject by setting the recommended shock (COMPLIANCE group), or set only Number 1 or Number 2 when the subject recommended a higher shock setting (NON-COMPLIANCE group). Finally, a within-subjects factor was incorporated into the methodology, viz, increasing provocation across the trials, with minimal shock settings of Number 1 for the first four trials. An analysis of these initial trials revealed only a main effect on the money factor in which the MONEY group set higher shock ( $\mathrm{M}=2.4$ ) than the NO-MONEY group ( $\mathrm{M}=2.0$ ). This finding is consistent with Dengerink (1971).

Further analysis of subsequent trials showed a number of effects. The NONCOMPLIANCE group, who were confronted with a confederate who refused to deliver high shocks, suggested lower levels of shock $(\mathrm{M}=2.9)$ than the COMPLIANCE group ( $\mathrm{M}=2.1$ ). The monetary reward also significantly increased suggested shock settings (once again, a finding consistent with Dengerink, 1971). Furthermore, increasing provocation across the trials tended to induce higher suggestions for shock by the subject, although this factor interacted with the compliance variable. Whilst the COMPLIANCE group suggested increasing levels of shock across the trials, the NON-COMPLIANCE groups' settings were attenuated by the non-cooperative actions of the responder. Finally, subjects instigated more aggression following a losing trial relative to a winning trial. The LO- and HI-MACH groups
did not significantly differ across the trials. A criticism of this study was Gaebelein's failure to provide an explanation as to why each subject's 'definitely unpleasant' pain threshold was determined and then why the electrodes were removed from the subject before any trials began. The findings may have been different to those reported had subjects received a shock after a losing trial (e.g., the NON-COMPLIANCE group may have set higher shock like the COMPLIANCE group across the trials if subjects had been receiving shock).

Gaebelein (1973b) conducted a systematic replication of the previous study using females only ( $n=40$ ) without the Machiavellian factor. The findings were highly similar to Gaebelein's initial study except that, unlike males, female subjects were not swayed by a monetary reward for responding with higher shock. Moreover, Gaebelein and Hay (1975) noted that Gaebelein's (1973a, 1973b) methodology confounded verbal and behavioural noncompliance and thus reported a study on the relative influence of these factors. The authors showed that behavioural non-compliance was more effective in suppressing aggression amongst females in comparison to verbal non-compliance, and that the behavioural/verbal compliance condition was least effective in suppressing aggressive responding. Gaebelein and Hay correctly acknowledged that these findings may not generalise to males since all subjects were female.

Finally, several studies have been devoted to the issue of sex differences during Taylor's reaction time procedure (Hoppe, 1979; Shortell \& Biller, 1970; Taylor \& Epstein, 1967). The first study was reported by Taylor \& Epstein (1967) who hypothesised that: "From a consideration of their direct social training, one would expect males to be aggressive to male antagonists, and relatively unaggressive to female antagonists, while females would be relatively unaggressive to both male and female antagonists" (p. 474). Twelve undergraduate males and 12 undergraduate females were told that they were either competing against a male or a female opponent. The subject was confronted with increasing provocation from the bogus opponent across 25 trials.

An examination of these data showed that whilst a main effect of subject's sex was not significant, there was a significant interaction between sex and increasing provocation from
the opponent. The interaction effect showed that females set lower shock relative to males on the initial trials, but then demonstrated higher increments in aggression across subsequent trials. Also, there was a main effect on the opponent's sex factor with higher levels of shock set against a male opponent. Not surprisingly, there was an interaction effect between opponent's sex and increasing levels of provocation with settings incrementing faster across the trials against a male opponent. Finally, there was a 3-way interaction between subject's sex, opponent's sex, and blocks. Females produced the highest rate of increase in aggression when competing against a male, whilst males, against a male opponent, tended to set uniformly high levels of shock across the trials. Females and males that competed against a female opponent set uniformly low levels of shock across the trials. That is, the female opponent led to the suppression of aggression in both males and females, whilst females competing against a male opponent were increasingly aggressive. This latter finding contradicts Taylor and Epstein's (1967) predictions of female aggression. Taylor and Epstein argued that this unpredicted finding was caused by a contrived experimental situation in which female subjects were forced to respond with electric shock on each trial. In the 'real world', females may choose a range of alternative (aggressive and non-aggressive) strategies that were otherwise precluded from Taylor and Epstein's experimental setting. However, it is noted that this an empirical issue that is yet to be tested. Shortell and Biller (1970) conducted a systematic replication study using sixth-grade children. The reported findings were similar to Taylor and Epstein which implies that the effects generalise to younger age groups.

Hoppe (1979) set out to explain why two thirds of the studies reviewed by Frodi, MacCauley, and Thome (1977) revealed that females are equally aggressive as males. The authors hypothesised that the single factor of 'gender' undermines the psychological complexity of this construct. A re-conceptualisation of masculinity and femininity by Bem (1974) suggests that people vary along two independent dimensions with respect to masculinity and femininity, and theorises that a balance between these dimensions (i.e., androgyny) has a liberating effect on the individual and facilitates self-actualisation. Studies have shown that the androgynous are flexible in their social behaviour and easily adapt to
changing situations (e.g., Bem, 1975; Bem \& Lenney, 1976). Thus, Hoppe investigated the relationship between sex role identification as measured by the Bem Sex Role Inventory (BSRI) and interpersonal aggression. He hypothesised that: "To the extent that this society considers aggressive behaviors to have adaptive qualities Bem's theory of androgyny would predict a positive relationship between aggressive behavior and androgyny" (pp. 318-319). ${ }^{\text {s }}$

Two introductory social science classes constituted the population who completed the screening instrument i.e., the Bem Sex Role Inventory (BSRI). Ninety six university students were classified as either masculine (scored above the median on the Masculinity scale and below the median on the Femininity scale), feminine (scored below the median on the Masculinity scale and above the median on the Femininity scale), androgynous (scored above the median on both scales), and undifferentiated (scored below the median on both scales). The methodological design contained two additional between-subjects factors, viz, opponent's gender and subject's gender. There were six subjects per cell with regards to the interaction between Gender of Subject, Gender of Opponent, and Subject's Sex Role Identification. Subjects were confronted with 25 trials (four blocks of six trials, plus a baseline measure) with increasing provocation from the bogus opponent.

An analysis of settings on the first trial (i.e., baseline measure) showed an interaction effect between Sex Role and opponent's sex. The utilisation of the Duncan Multiple Range test revealed that masculine subjects against a male opponent set the highest shock, whilst the other remaining groups did not differ from each other. Statistical analysis on the remaining trials returned a number of significant effects. The first effect reported by Hoppe (1979) was identical to the interaction effect on the baseline measure i.e., Sex Role by Opponent's Sex. Furthermore, there was a significant interaction between Subject's Sex and Subject's Sex Role such that male Masculine subjects were more aggressive than the other groups who did not differ from each other. Finally, all subjects reacted to increasing provocation from the

[^12]opponent across the trial with increments in aggression, however, subject's settings over each block of 2.0, 2.1, 2.3, and 2.6, lagged behind the opponent's mean provocation settings of 1.5, 2.5, 3.5, and 4.5, which led Hoppe to conclude that "subjects do not adopt an 'eye-for-an-eye' strategy but are rather less daring than their opponent" (p. 324). When later interviewed, subjects:

Tended to explain their behavior by stating that they were afraid of provoking their opponent into giving them yet higher levels of shock. Some reasoned that by lowering their own level of attack they might coax their opponent into doing the same. (p. 325)

On the whole, these data demonstrate the explanatory power of Bem's Sex Role Identification theory because male masculine subjects, who are a sub-group of males, exhibited the highest levels of aggression under Taylor's procedure, and that masculine subjects, regardless of gender, were more aggressive towards males. All other groups were equal with respect to aggression. The male masculine group constituted approximately $1 / 3^{\text {rd }}$ of the screening population. Hoppe argued that these findings probably explain why Frodi et al. (1977) failed consistently to demonstrate a difference between male and female aggression in a literature review of sex differences. It is worth comparing these findings with Taylor and Epstein (1967) who demonstrated that females and males were more aggressive towards a male opponent. Hoppe's data are consistent with Taylor and Epstein, although a qualifying factor is the subject's sex identification. However, Hoppe is particularly remiss when he states: "The finding of a relatively high degree of aggressiveness toward a male opponent among masculine subjects in general, irrespective of gender, is somewhat unexpected" (p. 327). Careful consideration of Taylor and Epstein's findings during Hoppe's concluding remarks may have prevented an unnecessary discussion about the anomalous nature of these data. It should also be noted that the androgynous group were found to be less aggressive than the masculine group in spite of Hoppe's predictions. Hoppe's logic that the social adaptability of androgynous individuals would make them more aggressive under Taylor's
procedure was based on a premature assumption that matching an opponent's shock settings is an adaptive strategy. In fact, comments made by subjects about not matching increasing provocation from the opponent, in order to coax the opponent towards less aggression, would suggest that an adaptive response, as identified by subjects, entails avoiding aggressive situations.

## Situational factors

Two studies have explored the effects on competitive aggression of a monetary reward for winning, both of which are reported by Gaebelein and Taylor (1971). ${ }^{6}$ The primary aim of Gaebelein \& Taylor's first study was to assess the effects of a monetary reward for winning upon shock settings when the opponent set the lowest possible shock across all trials i.e., minimal shock of Number 1. Twenty undergraduate males competed against a bogus opponent over 25 trials. Twelve of these trials were intended to induce a high competitive situation, whilst the remaining 12 trials were intended to induce a moderate competitive situation. The methodology was counterbalanced such that half of the sample were in the highly competitive situation first and the moderately competitive situation second, whilst the other half of the sample were in the moderately competitive situation first and then the highly competitive situation second. The high competitive situation was created by offering subjects 10¢ for winning on any given trial (of the 12 trials for a monetary reward), whilst the low competitive situation was created by suggesting that winning meant avoiding electric shock only.

An analysis of the shock settings between levels of competitiveness revealed no significant effect. Subjects during high competition set a shock of 1.99 , and during moderate competition they set a shock of 1.93 . A shortcoming of this study is that the sample was relatively small $(\mathrm{n}=20)$ which reduced the probability of finding a main effect. Another shortcoming of this study was the relatively small size of the reward ( $10 \notin$ per trial). A higher
reward (of say $\$ 1$ per trial) may have produced more competitive aggression amongst subjects. ${ }^{7}$ Furthermore, a criticism of this study, acknowledged by the authors, was that the opponent set minimal shock levels across all trials. They concluded that an interaction effect may have occurred if subjects faced an opponent who set increasing levels of shock. The primary aim of Study 2 was to test this hypothesis.

During Study 2, 30 undergraduate males were randomly assigned either to high competition (shock avoidance plus $5 \phi$ per trial), moderate competition (shock avoidance), or no-competition (in which the subject was told that the experimenter had pre-determined who would receive shock on each trial). Increasing provocation from the opponent was treated as a within-subjects variable. Like most research using this procedure, shock settings increased across the trials from 1.5 during the first block of trials to 4.5 during the final block. A questionnaire was administered after the study evaluating subjects' perceptions of their performance, of the task, and of the opponent. Analyses of these ratings showed that the experimental manipulations had the desired effect upon the competitive groups.

An analysis of these data showed that shock settings were not influenced by competition, but that a significant increase was observed as a function of attack. That is, average shock settings increased uniformly from 2.0 to 3.4 from the first block of trials to the final block of trials. Gaebelein and Taylor (1967) argued that these findings are consistent with past research (Buss, 1966; Taylor, 1967) in which attack is a potent antecedent of aggression. They concluded that: "Putting the results of the two studies together, it might be postulated that when attacked or threatened in a competitive situation, one will counterattack but that the competition per se does not appear to increase the likelihood that one will initiate the attack" (pp. 66-67).

[^13]Like the first study reported by Gaebelein and Taylor (1971), a major shortcoming of the second study was the small sample size for each competitive group ( $n=10$ ). The study was actually biased towards finding an effect for attack and not competition because the first variable was a within-subjects factor, while the between-subjects factor contained only 10 subjects per group. Thus, it is little wonder why the attack factor was significant and competition was not. Another criticism was the size of the reward ( $5 \phi$ per trial) which was even smaller than for the first study.

A slightly different procedure has entailed subjects receiving higher monetary rewards for setting more intense shock against the bogus opponent. Research conducted on personality factors have shown that monetary rewards lead to an increase in the intensity of shocks from the subject, particularly under increasing provocation from the opponent (Dengerink, 1971; Gaebelein, 1973a). Following from research on instrumental aggression (Buss, 1966), Borden et al. (1971) randomly assigned 40 male undergraduates to either an instrumental condition where subjects received more money for higher levels of shock (i.e., $1 \phi$ for setting a Number 1 shock, $2 \phi$ for a Number 2 shock, $3 \varnothing$ for a Number 3 shock, etc.; see Dengerink, 1971) or a non-instrumental condition (i.e., no money regardless of settings). Subjects within these groups were assigned further to an opponent who set either increasing levels of provocation or constant minimal levels of shock i.e., Number 1. There were 25 trials i.e., a baseline and four blocks of 6 trials.

Preliminary analyses on the baseline measure showed that the opponent type did not influence initial shock settings, but that a monetary reward significantly increased shock levels (consistent with the findings of Dengerink, 1971, and Gaebelein, 1973a). Further analyses of subsequent trials showed that the monetary reward increased shock settings consistent with the baseline measure, that an aggressive opponent elicited greater levels of shock from the subject, but that there was no interaction between the money and opponent type factors. In sum, Borden et al. (1971) have conducted a neat replication of the effects of a monetary reward and different types of opponents on competitive aggression.

A consistent finding in the review thus far has been the effect of increasing provocation on subject's settings. O'Leary and Dengerink (1973) extended this type of analysis by assessing the influence of different types of attack on subject's aggression. O'Leary and Dengerink adopted Epstein and Taylor's (1967) suggestion (that the effects of provocation accumulate over time) when they predicted that subjects would be most aggressive during the final trials if they had faced an opponent who set high shock on all trials (i.e., high provocation), and that subjects would be least aggressive if faced with an opponent who set low shock on all trials (i.e., low provocation).

Forty male undergraduates were randomly assigned to one of four groups and competed with the opponent on 25 reaction time trials. The HIGH group faced an opponent who set an average of 4.5 during each 6-trials block, the LOW group had an opponent who set an average of 1.5 during each 6-trials block, the INCREASING group's opponent set shock that increased from 1.5 during the first 6-trials block to 4.5 during the final 6-trials block, and the DECREASING group's opponent set shock that decreased from 4.5 to 1.5 across the blocks.

Whilst the groups did not differ on the first trial (i.e., baseline measure), there was a significant main effect on the attack factor. Mean shock settings by subjects in the HIGH, DECREASING, INCREASING, and LOW, groups were 3.7, 2.9, 2.6, and 1.8, respectively. In addition, there was an interaction between the attack and block factors. Post-hoc comparisons showed that the DECREASING group set lower shock than the HIGH group from the second 6-trials block onwards, and the INCREASING group set higher shock than the LOW group by the third block onwards. Finally, the HIGH group set the highest shock during the final block, the INCREASING group set the next highest level of shock, and the DECREASING group set higher shock than the LOW group but lower shock than the INCREASING group. This study has elegantly shown that subjects will match their opponent's settings and that the intensity of the opponent's shock accumulate over trials and influence subsequent counter-aggression by the subject.

Based on past research (e.g., Epstein \& Taylor, 1967; Maselli \& Altrocchi, 1969; Shortell et al., 1970), Greenwell and Dengerink (1973) extended the provocation factor by arguing that
the 'intention' attributed to the opponent's shock settings is more important in predicting subjects' aggression than the physical discomfort of receiving shock. The authors hypothesised that: "Subjects may act more aggressively when physical discomfort is mild and symbolic attack is strong than when physical discomfort is relatively intense and symbolic attack is comparatively mild" (p. 67). To test this hypothesis, Greenwell and Dengerink reported a study where there was a disparity between the shock received from the opponent, and the shock supposedly delivered as indicated by a light on the reaction time apparatus.

Undergraduates males ( $n=48$ ) were randomly assigned to one of four groups. In the first condition, subjects received visual feedback indicating increasing provocation from the opponent (i.e., 1.5 to 4.5 across the 24 trials), and received shock consistent with the visual display. In the second condition, subjects received visual feedback indicating increasing provocation but received shock of approximately Number 3 on each losing trial. In the third and fourth conditions, subjects received visual feedback indicating constant provocation (i.e., Number 3) from the opponent but received either constant shock or increasing levels of shock, respectively. It was predicted that if actual shock received was an influential factor then few groups would differ because they received approximately the same average shock across the trials.

An analysis of each group's mean settings showed an interaction between the blocks and light setting factors. Newman-Keuls tests indicated that the light-varying groups set significantly less intense shock than the light-constant groups during Blocks 1 and 2, but significantly more intense shock during Block 4. A further analysis of shock during winning and losing trials revealed an interaction effect between Win/Lose by Light Setting. Whilst there were no significant differences between the light constant groups, shock settings were significantly higher after a losing trial for the light increasing groups.

In sum, Greenwell and Dengerink (1973) have shown that male subjects tend to match an opponent's settings on the basis of visual feedback rather than on the physical discomfort of shock. They concluded that: "The physical discomfort experienced by a person may be subordinate to the symbolic elements that are incorporated in that attack" (p. 70). This
conclusion was strengthened by the finding that shock settings were higher after a losing trial but only when the subject was receiving visual feedback of increasing provocation from the opponent. An altemative explanation of these data (as mentioned by Greenwell and Dengerink) is that subjects utilised the visual stimulus because it is easier to discriminate between different levels of visual feedback than different levels of electric shock. However, Greenwell and Dengerink discounted this alternative explanation by reporting supplementary data where university students were able to distinguish accurately between varying levels of electric shock in the absence of visual feedback. On a theoretical issue, the finding that visual feedback is more important than actual shock provides suggestive evidence that competitive aggression has an underlying cognitive basis, rather than a negative affective basis. This theoretical point will be discussed in greater detail in the next chapter.

Epstein and Taylor (1967) reported one of several studies on the effects of defeat on competitive aggression. The frustration-aggression hypothesis was used as a theoretical basis for arguing that repeated defeat leads to more aggression towards an opponent. They cited Berkowitz (1962) who wrote that:

Competition must be regarded as a frustration by most definitions of these terms. Writers, of course, have differed in the details of their analyses of competition, but all are agreed as to the essentials. These involve (1) two or more units, either individuals or groups, engaged in pursuing the same rewards, with (2) these rewards so defined that if they are attained by one unit, there are fewer rewards for the other units in the situation. The losing unit is clearly frustrated. In a contest between two people, for example, the loser is a person instigated toward a particular goal, who then is prevented from reaching this goal by the other individual's victory. The contest may have been a fair one, and the loser may know he is supposed to be a good sport, but he still is thwarted (although this can be defined as a "reasonable" or "non-arbitrary" frustration). Aggressive tendencies are frequently the result. (p. 178)

Thus, on the basis of the frustration-aggression hypothesis, Epstein and Taylor (1967) predicted that aggression would be highest amongst participants who experienced the greatest number of defeats. Similar predictions were made with respect to participant's evaluation of the opponent, magnitude of physiological arousal, and self-reported anger. The authors also examined the potential interaction between degree of defeat and opponent's provocation type. The subject's opponent set either low settings on each trial (Number 1), high settings (Number 5), or matched the subject's shock from the preceding trial (i.e., Rational Opponent). The defeat factor was manipulated by assigning $1 / 3^{\text {rd }}$ of the sample to a high defeat condition (i.e., lost nearly all trials), $1 / 3^{\text {rd }}$ to a low defeat condition (i.e., won nearly all trials), and $1 / 3^{\text {rd }}$ to a moderate defeat condition (i.e., lost half of the trials).

Twenty seven male undergraduates were randomly assigned to the defeat conditions. All subjects attended three separate sessions in which they faced a different type of opponent during each session (i.e., low, high, or rational opponent). Thus, whilst the defeat variable was a between-subjects factor, the opponent-type variable was a within-subjects factor. There were 19 trials per session, viz, a baseline trial and three 6 -trials blocks.

A repeated measures one-way ANOVA showed that participants exposed to a high-attack opponent set significantly higher shock levels than when exposed to a low-attack or rational opponent. The latter two groups did not differ from each other. Mean shock settings for each group were 3.8, 1.3, and 1.3, respectively. Moreover, there was an interaction between the opponent type and block factors. High-attack opponents tended to elicit increasingly higher levels of aggression from participants across the trials relative to the other types of opponents, who tended to elicit a constant low level of aggression. The defeat factor was not significant as a main effect, but interacted with opponent type. The highest levels of aggression ( $\mathrm{M}=4.5$ ) were set by subjects in the moderate defeat condition when faced with a high-attack opponent. However, when the same group confronted a rational or low-attack opponent, mean shock settings were at the lowest possible level of Number 1. In addition, the low and high defeat conditions demonstrated a similar pattern of settings but the differences were smaller, relatively speaking. These findings are consistent with Merrick and Taylor (1970) who found
that the highest level of competitive aggression was demonstrated by subjects who experienced moderate defeat and an opponent delivering increasing shock levels. Epstein and Taylor (1967) concluded that "the condition of equal ability amplified the effect of the opponent's intended level of aggression upon S's aggression settings" (p. 276). The authors added that:

It thus appears that in a competitive aggressive situation, such as the present one, anger and aggression are apt to be determined not so much by frustration as by introjected social values which determine how the opponent's intended behavior should be dealt with. While there are innumerable examples in everyday life which illustrate how socially prescribed attitudes determine what is perceived as an instigation to aggression, independent of frustration, they have intended to be slighted because of the dominant role that the frustration-aggression hypothesis has occupied in theories of aggression. .... It is self-evident that all cultures must counteract any tendency for a simple, direct relationship to exist between frustration and aggression. (p. 281-282)

Therefore, it appears that cognitive processes are a powerful indicator of elicited aggression towards an opponent during Taylor's reaction time task. Most importantly for issues on the competition-aggression link is that the highly competitive situation (i.e., moderate defeat), which equates with competitors being of equal competence, led to the highest settings, particularly when the opponent was exhibiting high-attack responses. A major criticism of this study is the small sample size that, again, reduced the probability of finding a statistical effect on the degree of defeat variable. There were only nine subjects per group on this variable that may explain why there was a failure to return a main effect on the defeat factor.

Shortell et al. (1970) furthered the investigation of defeat by conducting a study on the potential for massive retaliation from the opponent. They wrote:

In view of the current world situation, a question that all but asks itself is the following: "What would the effect on overt and covert aggression be if the subject believed that he and his opponent had among their repertoire of punishing responses one that was far more devastating than all the others?" (p. 215)

Forty eight male undergraduates were assigned to either a condition of massive retaliation (MR) or a condition that did not include massive retaliation (NMR), and were then, within this division, further assigned to either a HIGH, MODERATE, or LOW, level of defeat as described by Epstein and Taylor (1967). The task board was slightly different for subjects in the MR group with "a bright red button, numbered $10 \ldots$, added to the panel of shock settings, and a red light, also labelled 10 , that was larger and brighter than the others... added to the feedback panel" (p. 315). MR subjects were told that the level-10 shock was set at twice the level of their pain threshold and would be extremely painful (although they were assured that level-10 shock would not cause serious injury). The level-10 shock setting was never administered to a subject. Each subject was confronted with 32 trials (i.e., four 8 -trials blocks) with increasing provocation from the opponent (i.e., 1.5 to 4.5 ).

An analysis of these data showed a significant main effect on the massive retaliation factor with the MR group setting higher shock ( $\mathrm{M}=3.1$ ) than the NMR group ( $\mathrm{M}=2.4$ ). ${ }^{8}$ The MR and NMR groups both exhibited a direct relationship between their own settings and those of the opponent across the trials. Consistent with Epstein and Taylor (1967) and Merrick and Taylor (1970) is the finding that the defeat factor did not reach significance as a main effect, however, the authors failed to demonstrate an interaction between increasing provocation and level of defeat. Recall that Merrick and Taylor (1970) showed that shock settings increased most rapidly in the moderate defeat group under increasing provocation. Subjects in the MR group reported feeling more anger during the experimental session than those in the NMR group, and rated their opponent as more aggressive. An interaction was also observed on

[^14]ratings of opponent's aggression between level of defeat and the massive retaliation factor. The opponent was rated more aggressive during low- and high-defeat by the MR group, but was rated less aggressive during moderate defeat, relative to the NMR group. Moreover, the moderate-defeat group rated the opponent as more competitive relative to other subjects.

In sum, Shortell et al. (1970) found that knowledge of a massive retaliation option led to a reduction in competitive aggression and increased self-reported anger. What is particularly interesting relates to subjects' ratings of the opponent's aggressive intent in the moderate defeat situation i.e., MR subjects ascribed less aggressiveness to the opponent. Epstein and Taylor (1967) have argued that the $50 \%$ defeat condition is an unstable and ambiguous situation where the subject attempts to establish dominance over the opponent. However, the present study has shown that the inclusion of a massive retaliation option causes subjects to feel a lesser need to establish dominance (by administering high levels of shock) because an aggressive response from the subject may be followed by massive retaliation from the opponent. In contrast, when the opponent is consistently winning, the subject fears the potential for counter-retaliation from the opponent if the subject chooses a high aggressive option (thus, ascribing greater aggressiveness to the opponent). Likewise, a subject that is consistently winning probably fears that the opponent will counter-aggress with an emphatic blow when provided an opportunity (hence ascribing greater aggressiveness to the opponent once more).

Hendrick and Taylor (1971) observed that an under-researched topic is the relationship between interpersonal attraction and aggressive behaviour. They theorised that a potential mediating factor of this relationship is the similarity of beliefs between two individuals, however, without any existing research, a number of likely relationships were hypothesised between these sets of factors. For example, belief similarity may engender an expectation amongst parties that they will not aggress against each other, which may cause the provoked individual to react with large counter-aggression when this expectation is violated. Dissimilar beliefs may cause an individual to expect aggression and thus produce less counter-
aggression. In contrast, belief similarity may cause individuals to perceive provocation from an opponent as less aggressive than individuals with dissimilar beliefs.

Following the establishment of pain thresholds, 48 male university students were administered the belief similarity manipulation. Half of the subjects were provided with a cover story on the potential relationship between competition and knowledge of the opponent, and were requested to complete an attitude questionnaire (as devised by Byrne, 1969) in which they were asked to agree or disagree with 10 items. Upon completion of the questionnaire, the experimenter left the study room and returned with an ostensible copy of the competitor's attitude questionnaire. Half of the subjects were handed a copy of a questionnaire in which the competitor supposedly agreed with eight of the attitude items (i.e., belief similarity; B-SIM), whilst the other half of subjects were given a copy in which the competitor agreed with only two items (i.e., belief dissimilarity; B-DIS). Subjects then competed on 19 reaction time trials either against a non-provoking opponent who set low shock all the time $(\mathrm{M}=1.5)$ or a provoking opponent who set high shock all the time $(\mathrm{M}=4.5)$. A questionnaire was subsequently administered to subjects on the effectiveness of the experimental manipulation (i.e., belief similarity), and to assess competitors' attitudes towards the opponent. An analysis of the manipulation checks showed that the B-DIS group rated their opponent as having less similar beliefs than the B-SIM group, but there were no main or interaction effects for each groups' perceptions of the opponent's aggressive intent. Moreover, the high aggressor was perceived as more aggressive than the low aggressor, and there were no main or interaction effects with the belief similarity groups. In addition, the groups did not differ on the baseline aggression measure.

An analysis of aggressive behaviours showed that the opponent-type factor influenced subjects' shock settings (i.e., the high aggressor elicited more aggression than the low aggressor), but the belief similarity factor had no influence on the groups, nor was there an interaction effect between belief similarity and type of opponent. It is highlighted that these lack of behavioural differences between the B-SIM and B-DIS groups occurred despite the former group indicating that they liked their opponent relative to the latter group. A more
predictable finding was that subjects had a lower inclination to like the high aggressor in comparison to the low aggressor.

In sum, Hendrick and Taylor (1971) have demonstrated that belief similarity, which is a variable that supposedly mediates attraction to others, does not increase or reduce competitive aggression. They suggested that:

Physical aggression and attraction are different classes of behavior, generally responsive to different sets of independent variables that only partially overlap. Variation in attraction and aggression may co-occur as a result of simultaneous manipulation of their respective independent influences. But such occurrence does not mean that attraction mediates aggression. (p. 347)

They further added that:

Physical aggression seems to be determined largely by perception of aggressive intent, increasing provocation, and actual attack. Whether an opponent is similar or dissimilar in beliefs, or whether he usually likes you, is irrelevant if an attack by him is perceived as impending. (p. 348)

In spite of these conclusions, a major criticism of this study' is the contrived nature of the belief similarity manipulation that supposedly generates an appropriate attraction to the opponent. The authors assumed that subjects' indications that they liked their opponent, whom they never saw or interacted with, was equivalent to the nature of 'attraction' in a natural social environment where individuals are attracted by physical appearance, mannerism, and beliefs (as indicated by discursive exchanges). That is, the belief similarity manipulation, as generated by the attitude questionnaire, is a very indirect measure of attraction as an everyday phenomenon. The authors acknowledged this criticism (to some degree) when they suggested an alternative experimental manipulation of attraction: "A
confederate might engage in intense preliminary interaction with subjects in such a way as to create either high liking or disliking" (p. 348). Therefore, Hendrick and Taylor's (1971) conclusion that aggression is not influenced by attraction requires more careful investigation.

Epstein and Rakoksy (1976), working on a related concept to attraction, investigated the effects of observing a model, who competed on the reaction time trials, on competitive aggression. The aim of this investigation was to examine the surmise that the imitation of aggressive behaviour is greatest when the confederate is perceived as 'admirable'. However, what is considered to be an 'admirable' or an 'unadmirable' aggressor were not clearly defined by the authors. The authors operationally defined an 'admirable' model by the following traits: cooperative, polite, uncomplaining, respectful of their opponents, able to withstand pain, and emotionally calm. An 'unadmirable' model was contra-indicated by these traits.

Thirty two male undergraduates were randomly assigned to one of four conditions, viz, admirable aggressor (AA), unadmirable aggressor (UA), admirable non-aggressor (AN), and unadmirable non-aggressor (UN). Subjects were provided with a cover story that the researchers were looking at human reactions to competitive situations, and that the experimenter was interested in the subject's perceptions of the competitor compared with a neutral observer's evaluations. Subjects were led to the experimental room and were requested to evaluate a model on a 22 -item checklist during a series of competitive reaction time trials. Those who were assigned to the admirable model observed a confederate who said he enjoyed competition and was not unduly disturbed by receiving shock. The confederate participated in the reaction time trials without disparaging his opponent and expressed the opinion, at the completion of the session, that the competition had been challenging. In contrast, subjects who were assigned to an unadmirable model observed an "excessively emotional, immature person who behaved in an anxious and blustering manner and conveyed the impression that he was willing 'to dish it out but could not take it' " (p. 565). The model attempted to cheat during the experimental session, but was warned by the experimenter for his conduct, and made continual bitter comments and directed profanity
towards the opponent. The manipulation of an aggressive/non-aggressive model was conducted by having the confederate set either repeatedly low shock in reaction to increasing provocation from the confederate's opponent (non-aggressive model), or increasing levels of shock to match the increasing provocation of the opponent (aggressive model). Preliminary analyses showed that each type of model was perceived in a manner intended by the researchers e.g., the aggressive models were perceived as more aggressive than the nonaggressive models.

Following interaction with a model, subjects participated in 16 reaction time trials against a bogus opponent (i.e., a baseline measure and three blocks of 5 trials). The opponent increased provocation at a consistent rate from 1.5 to 3.5 across the trials. An analysis of the baseline data showed a main effect on the aggressiveness manipulation with the nonaggressive model eliciting greater levels of shock than aggressive models. There was also a main effect across the three blocks on the same factor with, again, the non-aggressive model eliciting higher shock from the subject. In addition, there was a blocks effect with both aggressive and non-aggressive groups increasing settings in response to the opponent's provocation (but at a lower rate). The authors then re-assigned subjects on the basis of whether they perceived their model as either aggressive or non-aggressive. This reassignment process was undertaken independently for the admirable and unadmirable models. A re-analysis of these data showed a significant interaction effect between the admirable and aggressiveness factors. However, no post-hoc comparisons were conducted by the authors with the findings presented in two separate figures. What is evident from the figure is that those who observed the aggressive model set relatively low shock during the first 5 trials ( $M=1.3$ ), whilst those who observed the non-aggressive model set relatively higher shock $(\mathrm{M}=1.9)$. By the final 5-trials block, the AA group increased shock $(\mathrm{M}=3.3)$ to a level equivalent to the $\mathrm{UN}(\mathrm{M}=3.2)$ and $\mathrm{AN}(\mathrm{M}=3.0)$ groups, but the UA group lagged at approximately 2.0 . That is, the unadmirable aggressive model had a negligible effect on increasing subject's competitive aggression against an opponent who increased provocation across trials.

A major shortcoming of this study was the re-assignment of subjects across the aggressive model groups after there were no differences on the initial analyses. The authors provided some rationale for this statistical procedure:

The failure of some subjects to perceive the models in the manner intended is, in itself, of considerable interest, as it reveals that subjects are not passive recipients of what is presented to them, but form impressions based on their own needs and values. This has important implications for the influence of modeling upon behavior, because it indicates that not only may what is perceived influence values, but extant values may influence what is perceived. (p. 573)

However, there was no explanation provided as to why some subjects perceived the aggressive model as relatively less aggressive, and why others perceived the non-aggressive model as relatively aggressive. It leads one to conclude that the experimenters' manipulations were less powerful than intended. A limitation of this study was that male aggression was examined for influences from a male model without any consideration given to the differential effects on aggression of the model's and subject's gender. The findings may have been considerably different if a female model had been used and/or subjects were females. Moreover, these findings may have been more reliable had a larger sample (than 8 subjects per cell) been utilised.

A final situational factor studied was the influence of an audience on competitive aggression (Borden \& Taylor, 1973). The authors suggested that subjects' aggressive behaviour may be influenced in two different ways depending on the situation and the type of coercion exerted by the audience. In the first case, it has been observed that small groups persuade dedicated individuals to behave aggressively during non-aggressive social interactions e.g., gang behaviour (see Bandura, 1973). In the second case, an audience can persuade a target, during an altercation, to behave non-aggressively. Borden and Taylor (1973) conducted a study to test both theories simultaneously.

Forty male undergraduates were randomly assigned either to a relatively passive opponent (i.e., one who always set the lowest possible shock level) or an aggressive opponent (i.e., one who always set the highest possible shock level). The experimental design was counterbalanced so that half of each group were either alone during the first half of trials (and were then exposed to an audience), or were alone during the second half of the trials. During the audience trials, the experimenter introduced three confederates (two females and one male) who were supposedly psychology undergraduates who requested to observe an experiment. During the first 4 trials, the audience was silent and merely observed the subject (a manipulation that assessed the influence of the mere presence of an audience). During the remaining 12 trials, the audience behaved in order to coax the subject to set the most intense shock level towards a passive opponent or coax the subject to set the lowest shock level against an aggressive opponent. That is, subjects assigned to a passive opponent were encouraged to behave aggressively, whilst subjects assigned to an aggressive opponent were encouraged to be relatively less aggressive by the audience. There was a total of 28 trials. Twelve trials were conducted with the subject alone, whilst 16 trials were conducted with the presence of an audience (in four of which the audience was passive).

The findings presented by Borden and Taylor (1973) were highly consistent with the aforesaid theories. Subjects matched with a passive opponent responded with minimal aggression ( $M=1.8$ ) when alone preceding the social pressure of an audience. The introduction of silent observers did not significantly influence their aggressive behaviour ( $M=1.7$ ), however, subjects increased their settings dramatically when the audience encouraged them to behave aggressively ( $\mathrm{M}=6.5$ ). Not surprisingly, subjects who were pressured to behave aggressively before being alone (i.e., the counterbalanced condition) set high shock levels $(M=8.2)$, and this effect persisted ( $M=5.7$ ) when subjects were subsequently alone. That is, there was a transfer effect on aggressive behaviour, after audience pressure, into the alone trials. However, this transfer effect was not observed amongst subjects who were exposed to an aggressive opponent. Subjects who were initially alone against an aggressive opponent set high shock levels $(M=7.7)$ which rose slightly in the mere presence
of an audience ( $\mathrm{M}=8.3$ ), but fell dramatically when later exposed to a passive audience ( $M=2.3$ ). Likewise, subjects set minimal shock towards an aggressive opponent ( $M=2.4$ ), relative to the initial trials where the audience was passive ( $M=6.8$ ). However, when subsequently left alone, the reduced aggression effect did not persist because shock settings rose to levels demonstrated during the mere presence of an audience ( $\mathrm{M}=6.1$ ). Thus, Borden and Taylor showed that subjects were more aggressive in the mere presence of an audience than when alone, regardless of the opponent's settings. The authors concluded that: "The present research indicates that the typically observed relationships between attack and retaliation can be drastically modified by manipulations of the immediate social surroundings" (p. 360). In addition, the authors modified claims that "the mere presence of observers had a mild facilitative effect on aggression toward both aggressive and nonaggressive opponents" (p. 360), by citing Baron (1971) who has shown that high-status audiences can suppress aggressive tendencies. Borden and Taylor suggest that the "characteristics of the observers of an aggressive altercation (e.g., their age, status, and sex) may be important determinants of the intensity of aggression expressed by the participants" (pp. 360-61).

A limitation of this study is the utilisation of male subjects only which suggests that the results may not generalise to females. Moreover, the audience was composed of males and females, and there was no test of the potential varying effects of same- and mixed-gender audiences upon competitive aggression, nor of any test of the relative authority status of the audience (e.g., high versus low authority figures). Further research is required to examine the potential effects of different types of audiences on competitive aggression.

## Methods for reducing competitive aggression

Most studies using Taylor's procedure have focussed on the issue of situational and personality factors that lead to competitive aggression. The other side of the issue concerns the investigation of factors that mitigate or control the link between competition and
aggression. Pisano and Taylor (1971) have noted that there is a surprising lack of research from the general aggression field on this issue, and the competition-aggression literature is no exception with only three studies devoted to this topic (Dengerink \& Bertilson, 1974; Kimble et al., 1977; Pisano \& Taylor, 1971). There are a number of strategies that may be employed to reduce a competitor's aggression. Firstly, the competitor can intimidate the opponent by behaving with intense aggression. Secondly, the competitor may produce a passive strategy (i.e., minimally aggressive) with the hope that the opponent will reciprocate these responses. Thirdly, the competitor may combine the passive and punitive strategies by matching the attacker's aggressiveness. An additional strategy for reducing aggression is to offer competitors a monetary reward for withholding aggressive responses.

Pisano and Taylor (1971) examined the relative effectiveness of each strategy on reducing competitive aggression under Taylor's procedure. Forty male undergraduates, who were screened from other potential subjects on the criterion of setting high shock on a baseline measure (i.e., Number 3, 4 , or 5 , setting), were randomly assigned to one of four conditions. For comparative purposes, a further 12 subjects, who set minimal levels of shock on a baseline measure (i.e., Number 1 or 2 setting), were randomly assigned to two of the aggression-reduction conditions (i.e., passive and punitive opponents). Each subject participated in 25 trials i.e., a baseline measure and four 6 -trials blocks. Subjects assigned to the passive condition (PASS) were confronted with an opponent who set minimal shock over the 25 trials (Number 1 shock); subjects assigned to the matching-response condition (MATCH) had an opponent who set 1-intensity shock on the first trial and then set a level of shock that the subject chose on the preceding trial; subjects in the punitive condition (PUNITIVE) had an opponent who continually set the maximum intensity shock on each trial; and, finally, subjects assigned to the money condition (MONEY) were confronted with an opponent who set maximum shock on each trial and were offered a higher monetary reward for lower intensity shock (i.e., $5 \phi$ for setting a Number 1 shock, $4 \phi$ for a Number 2 shock, $3 \phi$ for a Number 3 shock, and so on).

Pisano and Taylor (1971) subsequently conducted statistical analyses by dividing the responses into initial effects (i.e., the first 6 -trials block) and long-term effects (i.e., the remaining three 6 -trials blocks). An analysis of the first 6 trials showed that the most effective strategy amongst high aggressors was the matching-response manipulation, whilst the least effective was the punitive strategy. The mean shock settings for the MATCH, PASS, MONEY, and PUNITIVE, groups were 2.5, 2.9, 3.4, and 3.9, respectively. These group means were significantly different from each other. The authors then proceeded to examine the long-term effects of these strategies. Once again, the pattern of group means were of the same intensity. An examination of the low aggressors showed that the passive opponent elicited low intensity shock across the four blocks of 6 trials (1.1, 1.1, $1.0, \& 1.0$, respectively) which contrasts sharply with the high aggressors who selected shock intensities around 3.0. Low aggressors also demonstrated a different pattern of settings against the punitive opponent. Low aggressors initially set relatively low shock ( $\mathrm{M}=2.4$ ) on the first 6 trials and then selected a shock level during the final block $(M=3.8)$ equivalent to what the high aggressors chose in the initial trials.

Based on these findings, Pisano and Taylor (1971) concluded that the punitive strategy is highly ineffective in controlling aggression (regardless of the aggressive disposition of the subject) and that the passive strategy is effective with low aggressors only because "it is possible that the behavior of the high aggressor was being reinforced by the knowledge that his victim was suffering injury" (p. 241). The most effective strategy was the 'eye-for-aneye' strategy in which the subject's responses were matched by the opponent. The inherent ambiguity of not knowing what the opponent has set on each trial is minimised under this strategy with the subject's shock settings being matched by the opponent which probably causes the subject to set low intense shock in order to avoid punitive responses from the competitor.

Whilst Pisano and Taylor's (1971) study provides valuable findings because of the paucity of research on the topic of minimising aggression, there are, nevertheless, shortcomings to the study. For example, there was no rationale provided as to why the analyses were divided into
short- and long-term effects which is not a trivial criticism as the convention under this paradigm has been to examine the blocks as a whole in a repeated measures analysis. Another criticism of this study is the low number of subjects per group, as well as the disproportionate number of high- and low-aggressors. Finally, a limitation of this study was the failure to incorporate all types of strategies for low aggressors which suggests that Pisano and Taylor's conclusions are premature with respect to the most effective aggressionreduction strategies for all types of subjects. However, this last criticism could be overlooked as clinicians are most interested in minimising anti-social behaviours amongst high aggressors.

Dengerink and Bertilson (1974) conducted a further study on strategies for reducing aggression under Taylor's competitive reaction time procedure. The authors reported a methodology that sought to explore additional strategies that might be utilised to reduce aggression as Pisano and Taylor (1971) used only a limited set of techniques. For example, one additional strategy entails the opponent reducing shock intensity across the trials from the highest to the lowest level. Recall that both O'Leary and Dengerink (1973) and Dengerink et al. (1975) found that subjects reciprocate the settings of the opponent during this type of strategy. Moreover, there is some interpretational ambiguity of the matching-strategy condition as to whether subjects reduced their settings as a condition of the opponent's settings or whether subjects reduced their settings in an instrumental manner i.e., an active endeavour to force the opponent to reduce shock. Dengerink and Bertilson employed a yoking procedure to evaluate these two competing interpretations.

Thirty male undergraduates, who were screened on the basis of setting a Number 5 setting on a baseline measure, were confronted with an opponent who set high shock (Number 5) on the first 6 trials. Subjects were then randomly assigned to three types of strategies for the remaining 18 trials (i.e., three blocks of 6 trials). In the matching condition (MATCH), the opponent set the intensity that the subject set on the preceding trial. In the Yoked condition (YOKED), the opponent set a shock on each trial that had been set on that particular trial by the previous subject in the MATCH condition. In the withdraw condition (WITHDRAW),
the opponent set lower shock across the trials. A questionnaire was administered to subjects at the end of the study in order to measure the extent to which they were influenced by the opponent's settings.

An analysis of the initial baseline trial returned no significant differences between the groups. However, analyses of subsequent trials showed a significant main effect on the strategy type factor. The mean shock settings for the MATCH, YOKED, and WITHDRAW, groups were $4.3,3.4$, and 2.4 , respectively. There was also a blocks effect with mean settings falling from 4.2 during the first 6 -trials block to 2.6 during the final 6-trials block. All groups demonstrated a significant reduction in mean aggression from the first block to the fourth block. It is a relevant finding that all groups did not differ on the first 6-trials block, but that the WITHDRAW group differed from the YOKED and MATCH groups on subsequent blocks, whilst the latter two groups did not differ significantly across all three blocks. That is, "the withdraw strategy ... resulted in a reduction of aggression that was considerably more rapid and, within the limits of the current testing, greater than that observed for either of the other two strategies" (Dengerink \& Bertilson, 1974, p. 260). Subsequent analyses of questionnaire data showed that the groups did not differ with respect to which they thought their shock settings influenced the opponent, nor did they differ in the extent to which they thought their own settings were influenced by the opponent's settings.

These findings prompted Dengerink and Bertilson (1974) to write:

With the exception of the one subject, it appears appropriate to conclude that if one person provokes a second person to high intensity aggression, then the first person can effect a reduction in the aggression of the second by becoming as nonaggressive as possible. (p. 260)

A striking finding is the lack of differences between the MATCHED and YOKED groups which implies that subjects' settings decreased regardless of the opponent's settings. That is, the reciprocation of shock by the opponent did not cause subjects to shape actively the
opponent into lower levels of aggressive behaviour within the MATCH group because these decrements were also observed in the YOKED group. Subsequent questionnaire data showed that subjects were unaware of the contingencies between the opponent's settings and their own. In spite of these data, Dengerink and Bertilson raised a procedural issue of Taylor's reaction time task that led to a biased test of subjects' rationalisation of their aggression in the matching-response condition (i.e., the large time delay of 80 seconds between subject's initial shock setting and the opponent's setting on the next trial). However, this is an improbable explanation as Bertilson, Wonderlich, and Blum (1984) have 'conceptually replicated' Dengerink and Bertilson's findings using a non-competitive interpersonal communications task. ${ }^{9}$ That is, the most effective strategy is the withdrawal procedure, and yoked subjects perform identically to matched subjects. Finally, it should be highlighted that decrements in aggressive behaviour only occur when the opponent sets high shock during initial trials since Pisano and Taylor (1971) failed to demonstrate reduced shock settings (relatively speaking) using a strategy of minimal aggression across all trials (Kimble et al., 1977).

Kimble et al. (1977) devised a testable mathematical formula for predicting counteraggression. The formula is the ratio of one competitor's counter-aggression divided by the other competitor's aggression (cA/A formula). The counter-aggression formula is based on the surmise that:

Many people feel that the most effective means of inhibiting assaults by a bully is retaliation. But a retaliatory strategy could just as easily lead to each side trying to get even, causing a progressive escalation of violence. The problem is whether retaliation (or how much retaliation) leads to increased or decreased subsequent aggression.
[Italics added] (p. 273)

[^15]They theorised that individuals are expected to retaliate to aggressive attacks ("Do unto another as that other has done unto you" i.e., Gouldner's, 1960 , reciprocity norm) but that the display of passiveness following an aggressive attack leads to the exploitation of the passive person, particularly amongst peers (Patterson, Littman, Bricker, 1967). Based on these theories, Kimble et al. predicted that aggression would spiral downwards when the cA/A ratio is less than 1.0 , but would remain constant or increase when the ratio is 1.0 or greater since there is no reduction of aggression to be reciprocated by the subject. Finally, Kimble et al. predicted aggression to increase when ratios are around 0.0 as this leads to the exploitation of the passive opponent.

One hundred male undergraduates were randomly assigned to 1 of 10 counter-aggression groups. A modification of the original reaction time task was the utilisation of loud noise as a measure of aggression rather than electric shock. ${ }^{10}$ There were 25 trials i.e., four 6 -trials blocks and a baseline measure. In the passive and punitive groups, the bogus opponent's settings were identical for Trials 2 through 25 (i.e., .2 and 10, respectively). However, in the remaining groups, the opponent's settings were determined by the subject's settings such that the opponent's settings were either $.1, .25, .5, .75, .9,1.0,1.2$, or 1.5 , times as large as the subject's setting on the previous trial.

A statistical examination of these 10 separate groups over the short-term trials (i.e., 3-7) returned a strategy main effect, as well as a strategy by trials interaction effect. Tukey's Honestly Significant Difference tests indicated that the $.1 \mathrm{cA} / \mathrm{A}$ ratio produced less aggression than all ratios greater than 1.0 and that the punitive strategy produced more aggression than all ratios less than 1.0. Furthermore, a trend analysis showed that the .0 to 1.0 ratios produced a linear decrease in aggressive responding on the first block of trials, but no other groups created significant increases or decreases from trial to trial.

Interestingly, an examination of the long-term effects of counter-aggression strategies produced slightly different results. Once again, there was a strategy main effect with the 0.0

[^16]$\mathrm{cA} / \mathrm{A}$ ratio producing more aggression than the $.1, .25$, and .5 ratios, but less aggression than ratios of greater magnitude than .5. These results differ from the short-term effects insofar as the .1 strategy produced less aggression than the $1.0 \mathrm{cA} / \mathrm{A}$ strategy. The authors observed no significant interaction between the strategies and trials factors concluding that "the absence of a significant interaction over these blocks simply reflects the fact that changes in aggression levels occur in the early trials" (p. 276).

Analyses of the questionnaire items showed that subjects perceived themselves as fair in comparison to the opponent in groups with a less than 1.0 ratio, and relatively less fair in groups with a greater than 1.0 ratio. The authors also reported that subjects were aware of the relationship between their responses and their opponents' counteraggression, and the strategies they were adopting during the experimental session.

These results then indicate that there is a relatively complex relationship between competitive-aggressive exchanges of individuals and is largely predicted by the cA/A formula. A minimal amount of reciprocal aggression is an effective strategy for reducing the opponent's aggression, however, a very passive strategy will (sometimes) lead to the exploitation of the opponent. Moreover, the exact matching of aggression (i.e., $\mathrm{cA} / \mathrm{A}=1.0$ ) is relatively less effective in reducing anti-social responding. Kimble et al. (1977) wrote that: "Pisano and Taylor's (1971) research on the matching strategy is consistent with the popular idea of an-eye-for-an-eye aggression being the only way to deal with bullies. Present findings indicate that exact matching is a totally ineffective strategy for reducing aggression" (p. 277). The authors also strengthened their case by referring to consistencies between their own findings and clinical research:

The finding that counteraggression is stronger than the initial aggression increases is certainly consistent with Toch's (1969) research on violent interactions. In interviewing police and criminals about real-life acts of violence, Toch typically found that after the initial provoking aggression, there was an exchange of increasingly aggressive acts leading to the final destructive act. (p. 277)

They drew connections between the behavioural and questionnaire data sets by adding that aggressive exchanges led to the escalation of aggression because there is probably a perceptual distortion of each individual's behaviour. This argument is supported by the fact that the most aggressive groups (i.e., cA/A=1.2 and greater) indicated that they perceived their responding as fairer than the opponent's responding. The authors also raise potential limitations to these findings by suggesting that:


#### Abstract

Some qualifications should be made in our generalisation that relatively unaggressive behavior will yield the most favorable outcome. The situation examined here involved peers with no previous history of aggressive exchanges; equal, limited aggressive resources; and no strong motivation or extreme anger. When one opponent has greater, potentially overwhelming resources, different strategies may be more effective. Strong motivation or rage may change the effectiveness of some counteraggression strategies. For instance, a passive strategy might be perceived as passive aggression by an enraged person and matching aggression might be perceived more than getting even. (pp. 277-278)


In sum, it is noted that the authors have provided a useful framework from which to study competitive aggression under Taylor's procedure. The findings are perfectly consistent with Dengerink and Bertilson (1974) who found that a matching strategy was less effective in reducing competitive aggression than an aggression-reduction strategy. However, a major inconsistency between these two studies are the disparate conclusions on participants' perceptions of their behavioural contingencies. Dengerink and Bertilson (1974) concluded that participants were unaware of the contingencies, whilst Kimble et al. (1977) concluded that participants were knowledgeable on this score. Task of exploring this issue is left to future research since it is difficult to weigh up the relative merit of each argument as Dengerink and Bertilson's findings are supported by a conceptual replication study, whilst Kimble et al.'s study is a highly thorough design. Notwithstanding this suggestion, it is
argued that participants must have some idea about the behavioural contingencies since Kimble et al. have demonstrated a consistent pattern of counter-aggression across a range of strategies. Whether participants are consciously aware of these contingencies may not be a relevant issue; participants may be aware of these contingencies at a sub-conscious level. A major criticism of this paper is the division of statistical analyses into short- and long-term effects, as well as the absence of an adequate explanation as to why the second trial was excluded from the short-term analysis. On the first point, of the division of the statistical analyses, it would have appeared more appropriate for the authors to conduct a trend analysis with all trials incorporated into the design, rather than arbitrarily dividing the trials into shortand long-term effects.

## Summary and conclusions

Taylor's competitive reaction time procedure has been used in 28 studies that were reviewed in this section. A number of personality and situational factors were explored across these studies. A number of personality or individual difference factors were found to be related to competitive aggression such as hostility (Ohbuchi, 1982; Taylor, 1967), need for approval (Taylor, 1970), anxiety (Dengerink, 1971), Locus of Control (Dengerink et al., 1975), field dependence-field independence (Dengerink et al., 1975), depression (Dengerink \& Myers, 1977), and gender (Hoppe, 1979; Shortell \& Biller, 1970; Taylor \& Epstein, 1967). These relationships were frequently complex. In addition, a number of situational factors were reported as influencing competitive aggression such as a monetary reward for setting higher shock (Borden et al., 1971; Dengerink, 1971; Gaebelein, 1973a), an audience (Borden \& Taylor, 1973), type of provocation (e.g., O’Leary \& Dengerink, 1973; Pisano \& Taylor, 1971), a massive retaliation option (Shortell et al., 1970), confederate's level of compliance (Gaebelein, 1973a, 1973b; Gaebelein \& Hay, 1975), and defeat (Epstein \& Taylor, 1967; Merrick \& Taylor, 1970).

Whilst the findings were frequently consistent across the studies (e.g., subjects do not match increasing provocation from an opponent exactly), there were some inconsistencies (e.g., Shortell et al., 1970, found that level of defeat did not affect competitive aggression, whilst Merrick \& Taylor, 1970, reported that moderate defeat causes subjects to behave aggressively, relatively speaking).

There are a number of strengths to Taylor's reaction time procedure which probably explains the high proportion of consistent findings across studies exploring the same personality or situational factors. The standardisation of Taylor's procedure has meant that methodologies are easy to directly replicate and accurate comparison of findings are made between independent studies. A potential weakness of the standardised procedure is that the experimental effects may not generalise to other conceptual frameworks, however, a conceptual replication by Bertilson et al. (1984) has diluted the concern surrounding this weakness. Another strength of the studies using Taylor's procedure has entailed the appropriate screening of subjects on personality factors. Finally, confounding factors (e.g., practice effects) have been discounted as experimental noise. ${ }^{11}$

Just as there are strengths to Taylor's procedure, there are also actual and potential weaknesses. One potential limitation of this procedure is that the findings may only generalise to competitive situations where the competitor is being provoked by the opponent and there is provision for retaliation. However, little more can be said on this issue since it is an empirical question as to the relative frequency of this type of competitive situation. Another major limitation has been the over-utilisation of male university students across the 28 studies ( $\mathrm{n}=22$ or $78 \%$ ) which raises the possibility that the findings may not necessarily generalise to females and/or other age groups. There is some evidence that the findings generalise from males to females (Gaebelein, 1973b), however, these studies have often been

[^17]conducted post-hoc as a method of redressing the imbalance between the sexes. The few studies that have appropriately incorporated males and females in the one sample have tended to demonstrate gender differences (e.g., Taylor \& Epstein, 1967), thus supporting the argument for the inclusion of both sexes in each study, regardless of the topic being investigated.

Another limitation of Taylor's procedure is the potential confounding of electric shock and the competitive situation. Electric shock is an aversive stimulus that may elicit negative affect in participants during this procedure. Negative affect has been shown to increase aggressive responding. Thus, the suggestion is being made that there is a potential confounding between the negative affect elicited by electric shock, and the effects on aggression produced by competition per se. Although it is difficult to ascertain the empirical consequences of this suggestion, there is merit in exploring this issue in greater depth.

Moreover, a consistent shortcoming has been the assignment of small samples (approximately 10) to experimental groups. This has meant that the statistical tests employed have usually been biased towards returning significant main effects and non-significant interaction effects. The low number of subjects for each study also suggests that the inferential tests (e.g., $F$ tests) have been inappropriately utilised by each researcher.

Another shortcoming of Taylor's procedure is that subjects must choose between five shock levels without having the option of not being aggressive i.e., not administering shock to the opponent. That is, the procedure forces the subject to be aggressive. These findings may not generalise to situations where the competitor can choose to be non-aggressive (as opposed to less aggressive). There are two types of methodologies that would be useful in addressing this shortcoming. The first type would entail merely adding a no-shock option to the existing apparatus, whilst the second type would entail a new apparatus where the subject can choose to deliver 'definitely unpleasant' shock to the opponent, or no shock at all.

A criticism of these studies has been the inconsistent reporting of the association between game outcome (win/loss) and aggression. Whilst some studies have reported data on this association (Dengerink, 1971; Gaebelein, 1973a; Greenwell \& Dengerink, 1973), the vast
majority have failed to report this effect, even though it is a relevant issue to each study under this procedure (since the standardised procedure has entailed subjects winning $50 \%$ of trials).

Finally, there is potential contention as to whether shock under Taylor's procedure is an aggressive behaviour. There has been no direct validation study on this pertinent issue, however, there is indirect evidence that implies an aggressive undertone to the competitive reaction time task. For example, Taylor (1967) and others have shown that increasing provocation from an opponent causes a subject to increase their aggressive responses. Furthermore, a number of personality traits, reviewed previously in this section, that measure propensities for aggressive behaviour, have been found to be related to competitive aggression. However, these indicator data are preliminary evidence only, and an independent study is still required to evaluate the validity of shock settings as competitive aggressive behaviour.

### 3.3.3 Non-laboratory studies

The most widely documented studies from the competition-aggression field were conducted by Sherif and his colleagues who were interested in the evolving nature of group behaviour within an ecological setting (Sherif, 1967, 1972; Sherif \& Sherif, 1953, 1969, 1973). Sherif was primarily concerned with developing methods for reducing conflict between groups. He observed that:

In the past, measures to combat the problems of intergroup conflicts, proposed by social scientists as well as by such people as administrators, policy-makers, municipal officials, and educators, have included the following: introduction of legal sanctions; .... dissemination of correct information to break down false prejudices and unfavorable stereotypes; appeals to the moral ideals of fair play and brotherhood.
(Sherif, 1972, p. 199)

And he concluded that: "many of these measures may have some value in the reduction of intergroup conflicts, but, to date, very few generalizations have been established concerning the circumstances and kinds of intergroup conflict in which these measures are effective" (Sherif, 1972, p. 199).

Sherif and Sherif (1953) argued that a comprehensive understanding of attitude formation and behavioural development, both within and between groups, is best formulated by conducting an ecological, longitudinal study. The authors articulated a comprehensive set of hypotheses about group formation and subsequent relations between groups. For example, hypotheses about group formation included:

When a number of individuals without previously established relationships interact in conditions that embody goals with common appeal value and that require their interdependent activity for attainment, over time, a group will form. The formation of a group will be reflected in: (a) a definite group organization consisting of differentiated status positions and roles, and (b) norms regulating the members' behavior relative to one another and in activities commonly engaged in together. (Sherif \& Sherif, 1969, pp. 232-233)

A set of hypotheses was also formulated about the formation of relationships between groups (Sherif \& Sherif, 1953, 1969). It was hypothesised that, over time, hostility would develop from competition when two independent groups must compete for a common goal which each group strongly desires. Unfavourable stereotypes and attitudes about the outgroup are developed by the in-group, placing the two factions at a social distance to each other. Moreover, group members face serious repercussions if they violate their own group's norms. The development of hostility between groups is matched by a higher level of solidarity, and reorganisation of structure and practice, within the in-groups.

Finally, a set of hypotheses was formulated on methods for reducing hostility between feuding groups. These hypotheses were:

1. Contact between groups in activities that are pleasant for members of both groups, but which involves an independence of action between the groups, will not decrease an existing state of intergroup conflict;
2. When conflicting groups are placed under conditions embodying goals that are compelling for both groups, but which cannot be achieved by a single group through its own efforts and resources, will result in cooperation toward this superordinate goal. (Sherif \& Sherif, 1969, p. 255)

Finally, Sherif and Sherif (1969) added that: "cooperation between groups arising from a series of superordinate goals will have a cumulative effect toward reducing the social distance between them, changing hostile attitudes and stereotypes, and hence reducing the possibility of future conflicts between them" (p. 255).

Three separate studies, in different locations, were conducted using new participants on each occasion, as a method of testing these three sets of hypotheses. The first study was conducted in Connecticut in 1949; the second in New York in 1953; and the third at Robbers Cave, Okalahoma, in 1954. Since there is a good deal of overlap between these studies, this review presents a composite picture of them (except where otherwise stated).

Selection of participants for the study was highly meticulous in order to reduce the influence of unwanted extraneous factors such as personality and cultural differences (Sherif \& Sherif, 1953). Interviews were conducted with parents of prospective participants and with ministers of their church groups. Psychological tests (e.g., intelligence test, Thematic Apperception Test) were administered to prospective participants to preclude individuals from the study with behavioural problems such as hyper-aggression. Moreover, participants were chosen who had no prior relationship with other participants so that social predispositions, such as friendships or hostilities, were not transferred into the experiment. Participants were all males, of the same age (11-12 years), religious background, educational level, and socioeconomic status.

During the first phase of the study, 24 participants arrived to summer camp and were allowed to intermingle on site to form companions. When two or three days had elapsed, and the boys were beginning to form friendships, they were each requested to state three best friends on the pretext of getting suggestions for favoured activities for improving the camp. The friendship clusters were then systematically split into two camps (of twelve boys each) so that group members had only one of their three best friends, as stated during informal talks, in his camp. During 1953, one boy cried for ten minutes after the announcement of the split, which meant his separation from another camper whom he had formed a friendship.

During the second phase of the study, which lasted approximately five days, the two split camps participated in a number of tasks that embodied cooperation. The two separate groups camped out in the woods, cooked meals, improved a swimming hole, and cleaned up a rough field for athletics (amongst other activities). These were preferred activities amongst the boys. The two camps were separated as much as possible during these activities. Soon enough, the groups formed a high degree of internal solidarity. Group members used words such as 'we' and 'they' when they talked, and groups gave themselves a name to distinguish themselves from the other camp ("Red Devils" \& "Bull Dogs", 1949; "Panthers" \& "Pythons", 1953; "Rattlers" \& "Eagles", 1954). Moreover, a general hierarchy was formed with a leader and followers, and functional norms were established between group members. Sherif and Sherif (1969) wrote:

Wayward members who failed to do things "right" or who did not contribute their bit to the common effort found themselves receiving reprimands, ridicule, "silent treatment", or even threats (group sanctions). A boy who tried to "bully" others was successfully squelched, despite his greater size. By the end of the stage, however, most behavior in the group was in accord with the customary modus operandi that had been established, with very little need for frequent correctives. Some groups established standardized means for handling behavior that got "out of line". .... This sanction was administered by the leader with the consent of the membership. (p. 238)

During the third phase of the study, participants were told, during breakfast one morning, that a toumament would be conducted where the two groups would compete in a series of daily activities such as a tug-of-war, a treasure hunt, softball, soccer, and touch football. Sherif and Sherif (1953) wrote that the introduction of the tournament was perfectly natural because the two groups had frequently suggested to the camp organisers (before that day) that they should conduct a competitive tournament of sporting activities between the camps. The prize for the winning group (which was a camping knife for each group member) was displayed before the tournament began. Each activity carried points for winning. A running total of each group's score was placed on a poster each day so that participants could view their progress.

Observations were carried out by two participant observers who were graduate students. The observers appeared in the role of senior counsellors to the boys. Reports from these observers revealed a rapid degradation of relations between the groups as the tournament progressed. ${ }^{12}$ Sherif and Sherif (1969) wrote:

In each experiment, the tournament started with great zest and in the spirit of good sportsmanship to which these American boys had already been thoroughly indoctrinated. In each case, as the tournament progressed from event to event, the good sportsmanship and good feeling began to evaporate. The sportsman-like cheer for the other group, customarily given after a game, "2-4-6-8, who do we appreciate," turned to a derisive chant: "2-4-6-8, who do we appreci-hate." (p. 240)

Expressions of hostility became increasingly frequent and more intense. Sherif and Sherif (1953) provide an eloquent account of the 1949 study:

[^18]The Bull Dog group pulled into the lead on the first day and remained there. The adult observers all agreed that the teams were fairly matched in terms of individual players, but that the Bull Dog group had much more effective team organization. .... Even the Red Devils were not unaware of it. Bray, a Red Devil lieutenant, said on the third day, "The trouble is we don't cooperate." But as a group, the Red Devils responded to their increasingly apparent losing position by labeling the Bull Dogs "dirty players." They were sure that they could win if the Bull Dogs were not "such cheaters." They said, "At least we play fair." ... Of course, the Bull Dogs vehemently denied such charges. (p. 275)

At the completion of the tournament, the victorious group, who had won a camping knife, were elated with their victory and full of pride; the losing group members were dejected. Internal conflict developed within the losing group with the leader blaming lower-status members for the team's loss. The losing side showed signs of disorganisation. When the tournament ended, a planned frustration, induced by the experimenters, led to a protracted period of hostility between the camps. The groups hurled taunts and insults at each other, and had food fights and scuffles. During the 1954 study, the Eagles, upon losing the tournament, burned the Rattler's flag, which, in turn, led to a fight. Sherif and Sherif (1953) reported an incident between the camps just after breakfast when a boy from the winning team, who pulled out his knife and opened its blade during a scuffle, had to be restrained from brandishing it! Apple raids were orchestrated by each camp over several consecutive days (sometimes at anti-social hours), even after they were admonished by the camp organisers for such activities. The two camps refused to partake in any activity with the opposing group. Sherif (1967) concluded that:

If an outside observer had entered the situation at this point, with no information about preceding events, he could only have concluded on the basis of their behavior that
these boys (who were the 'cream of the crop' in their communities) were wicked, disturbed, and vicious bunches of youngsters. (p. 85)

The last stage of the study entailed the reduction of conflict between the groups. Of course, the intensity of hostility between the camps made the task of reducing conflict particularly difficult. Some activities, such as eating together in the same dining room, watching a movie in the same hall, or engaging in other entertainment within close proximity, failed to reduce conflict between the camps, and, in most cases, were seized upon as opportunities for further name calling and physical confrontation (Sherif, 1972). However, conflict between the camps was eventually reduced by introducing what Sherif and his colleagues called 'superordinate goals'. These goals:

Could not be attained by the efforts and energies of one group alone and thus created a state of interdependence between groups: combating a water shortage that affected all and could not help being "compelling"; securing a much-desired film, which could not be obtained by either group alone but required putting their resources together; putting into working shape, when everyone was hungry and the food was some distance away, the only means of transportation available to carry food. (p. 203)

Moreover, as predicted, a series of activities with 'superordinate goals' resulted in a cumulative reduction in tensions between the camps. Friendship choices shifted towards outgroup members, unfavourable attitudes significantly diminished, as did name calling and physical confrontations. Sherif and Sherif (1969) observed that:

In the end, the groups were actively seeking opportunities to intermingle, to entertain and "treat" each other. Procedures that "worked" in one activity were transferred to others. For example, the notion of "taking turns" developed in the
dining hall and was transferred to a joint campfire, which the boys themselves decided to hold. The groups took turns presenting skit and songs.

Given the alternative of returning in separate buses or on the same bus, members of both groups requested that they go home together on the same bus. ....

On the way home, a stop was made for refreshments. One group still had five dollars won as a prize. They decided to spend this sum on refreshments for both groups rather than to use it solely for themselves and thereby have more to eat. On their own initiative they invited their former rivals to be their guests for malted milks.

In sum, the hypotheses proposed by Sherif and his colleagues were consistently supported by three separate studies. A major strength of this project was the longitudinal, ecological nature of these studies. Participants were not aware that they were a part of a study. Independent observers took on the guise of a caretaker, counsellor, or supervisor, on the camp, and acted in that capacity only, taking notes of each day's events in a discreet manner. Systematic manipulations by the experimenters were conducted as a part of 'normal' camp occurrences. The campers participated in preferred activities, and competed in a tournament with games that they chose, and for prizes that they coveted. At no time were participants requested to partake in a task which was ostensibly designed to measure hostility or aggression. Moreover, Sherif and Sherif (1969) cite independent studies which have replicated their findings.

However, despite their best intentions, there are still minor shortcomings to this project. For example, there was no control group ever incorporated into the design which could act as a control to the experimental group. An implicit assumption made by Sherif et al. is that the evolution of hostile behaviours demonstrated by the boys was the product of the tournament with highly desired rewards. However, the question must be posed as to whether the same hostile behaviours would have occurred in the absence of a toumament. That is, would have the same pattern of hostile attitudes and behaviours develop between the two camps if a
control group was included in the study which differed from the experimental group in that there was no tournament for prizes? Another related issue is the status of the reward. Once again, would have the same pattern of attitudes and behaviours been displayed if a control group was run which differed from the experimental group in that a toumament was conducted without a prize? In the absence of these two types of control groups, we cannot make statements as to the precise influence of the tournament situation with or without a reward.

There are a set of studies which are not laboratory-based or ecological experiments (Cullen \& Cullen, 1975; Lefebvre \& Passer, 1974; Russell, 1983; Russell \& Drewry, 1976; Widmeyer \& Birch, 1984; Widmeyer \& McGuire, 1997) which have utilised data sets derived from sports matches. These studies are based on ex post facto designs. The authors typically operationally define the dependent variable as 'aggressive infractions' or 'fouls', and examine whether the outcome variable systematically varies with a pseudo-independent variable e.g., frequency of competition between teams. However, the independent variable has not been manipulated by the experimenter but is a naturally occurring factor. Four studies have analysed data sets derived from ice hockey (Cullen \& Cullen, 1975; Russell \& Drewry, 1976; Widmeyer \& Birch, 1984; Widmeyer \& McGuire, 1997), while the remaining two studies have examined hockey (Russell, 1983) and soccer matches (Lefebvre \& Passer, 1974). Amongst the factors examined for their relationship with aggressive infractions or fouls include:

1. Winning and losing i.e., game result or outcome;
2. Home and away i.e., game location;
3. Period of match i.e., time period;
4. Period of season i.e., season;
5. League standing (both absolute and relative);
6. Game importance e.g., first versus second division;
7. Frequency of interaction between two teams; and
8. Crowd size.

It is emphasised that these studies do not provide direct evidence pertinent to the issue of competitive aggression. What they do provide is relevant information about the situational and contextual nature of the putative link. These data are important when considering the manipulation of experimental factors or interpretation of experimental findings as they imply covariates of the relationship. A limitation of these data is that cause and effect is almost impossible to determine because data are collected 'after-the-fact' where the independent variable is not manipulated as in a true experimental design. There are a host of other factors that could account for the reported relationships. Another limitation of these studies is that the findings may not generalise from one sport to another because of the intrinsic characteristics of each sport. This may be particularly relevant when we consider violent relative to non-violent sports.

Widmeyer and McGuire (1997) conducted a correlational analysis of professional ice hockey matches from the National Hockey League (NHL) in North America. The authors attempted to establish a relationship between the frequency of competition between sides (i.e., Factor \#7) and the mean number of aggressive infractions per match. The rationale for the study was clearly stated: "Over the past 25 years, there has been increasing concern by the media, coaches, and even the players that the amount of aggression in ice hockey is out of control" (Widmeyer \& McGuire, 1997, p. 57). Widmeyer and McGuire further add:

One variable which has received little or no attention as an antecedent of aggression in sport is the frequency of competition. In an effort to reduce travel costs, various sports have adopted unbalanced schedules. Under such a system, teams which are in close geographic proximity compete with each other more often than do those which are more distant from each other. While this system has an economic advantage, it may have other consequences. Of interest here is the impact that the frequency of competition has on aggression exhibited by teams and players. (p. 58)

There are two competing theories proposed as plausible hypotheses on the relationship between frequency of competition and match aggression. Social contact theory (e.g., Festinger, Schachter, \& Back, 1950) suggests that cohesiveness is more likely to occur when individuals interact over repeated events. This implies that the more teams play one another, the more respect they should develop for each other, and consequently the less aggression they should display in their contests. In contrast, inter-group conflict theory (Sherif \& Sherif, 1969), based largely on the Robbers Cave Experiments, suggests that aggression develops between opposing camps when they are pitted against each other with identical goals.

As a method of testing these theories, Widmeyer and McGuire (1997) examined 840 regular games occurring in the 1987-88 season. Four divisions constitute the NHL with five to six teams in each division. During the 1987-88 season, a single team played other sides in their division between 7-8 times and there was a total of 345 intra-divisional matches. Teams played sides from outside their division three times throughout the season for a total of 495 inter-divisional games. The main hypothesis for this study predicted a greater number of aggressive penalties during the intra-divisional games, where teams play each other more often, relative to inter-divisional matches where teams play each other less often. Aggressive penalties were defined as behaviours in which the player 'intended' to inflict harm on his opponent at least $80 \%$ of the time (which is a relatively sound definition of aggression). These penalties were identified by conducting a study entailing consultation with hockey players and officials (see Widmeyer \& Birch, 1984). ${ }^{13}$

A one-way multivariate ANOVA revealed a significant amount of aggressive penalties during intra-divisional ice hockey games relative to inter-divisional matches. Follow-up univariate analyses revealed significant differences on fighting, roughing, cross-checking, high sticking, elbowing, slashing, charging, and instigating. The effect sizes for each significant infraction were moderate. They ranged from .42 to .63 . An analysis of the trend of aggressive (minor and major) and non-aggressive penalties across intra-divisional games

[^19]showed that minor and major aggressive infractions rose uniformly until games seven and eight where penalties fell slightly. Non-aggressive penalties fell uniformly across the eight games. The same sort of statistical analysis was conducted for inter-divisional games and showed that minor and major aggressive penalties increased uniformly across the three games, while non-aggressive and misconduct penalties uniformly fell.

Thus, Widmeyer and McGuire (1997) have elegantly demonstrated that teams who compete more often against each other display more aggressive behaviour during professional ice hockey matches. However, despite the apparent clear nature of these data, the authors were left to address some inconsistent findings. For example, why did aggressive penalties fall in the seventh and eight games of the intra-divisional season, and yet uniformly increase across the three inter-divisional games? Widmeyer and McGuire (1997) suggested that:

The decline in these penalties in games seven and eight can be attributed to the fact that these games occur very late in the season when these teams are competing with their intradivisional opponents for a playoff position. Therefore, in these games, teams reduce their aggression in order to minimize the likelihood of penalization and maximize their chances for victory. (p. 63)

They further added:

Most interdivisional games are held during the early and middle stages of the season, whereas, there is a heavy concentration of intradivisional games during the last month of the schedule. Thus, the final game ... between interdivisional opponents was taking place at approximately the same time as the sixth game was occurring between intradivisional rivals. Also, it could be argued that the lack of decline in aggressive penalties in game three of interdivisional play was due to the fact that the teams involved in interdivisional games were not competing against their opponents for a playoff position. (p. 63)

Widmeyer and McGuire (1997) also acknowledged and addressed competing interpretations of these data. One such interpretation suggests that a confounding factor is the greater importance often placed on intra-divisional matches because teams are competing for a place within the inter-divisional rounds. Intra-divisional games are frequently called 4-point matches since the winning team not only accrues two points but also denies the opposing side two points. The greater importance and value of intra-divisional games is reinforced by monetary rewards from team managements for beating intra-divisional opponents. The authors suggested that: "if importance of the contest was the factor responsible for the greater aggression in intradivisional games, then, these contests should contain a greater number of all penalties that are perceived by players as instrumental for success" (Widmeyer \& McGuire, 1997, p. 64). However, an analysis of instrumental aggressive penalties across intra- and inter-divisional games revealed no significant differences. The authors concluded that: "these data, therefore, indirectly support the notion that frequency of competition does contribute to aggression in professional ice hockey" (p. 64).

However, the explanation provided by Widmeyer and McGuire (1997) is not completely convincing because they down-grade the importance placed on inter-divisional matches which are played at a nation-wide level, and also fail to consider the contextual importance of 'derby' games between teams within close geographical proximity who have a history of competition. These are qualitative factors that are difficult to explain. A 'derby' game is a cultural phenomenon. Past playing records and personal experiences between players are factors that are not appropriately accounted for by Widmeyer and McGuire. These factors enhance the competitive complexity of a game to the extent that 'pride' and 'rivalry' have added meanings that may increase the chances of observing non-instrumental aggression. Thus, a further study is required to partial out the effects of geographical proximity as a causal explanation of the proposed association. Moreover, the explanation that intradivisional matches are influenced by monetary rewards, for example, may have been counterbalanced by the importance placed on inter-divisional matches which are played at a nationwide level and entail a higher level of prestige for winning. In sum, the simple explanation of
competition frequency is placed amongst a host of competing interpretations (e.g., contextual factors) that confound these data. In spite of these interpretations, the competition-aggression link (i.e., the notion that increasing levels of competition lead to aggression) has been demonstrated regardless of whether the underlying cause is frequency of competition, history, or rewards (e.g., prestige), or a combination of these factors.

Cullen and Cullen (1975) conducted a study analysing ice hockey matches in which they explored Factor \#1 (Game result), Factor \#2 (Game location), and Factor \#3 (Time period). No theories or hypotheses were proposed with regard to the influence of these factors on aggressive infractions. Fourteen ice hockey games were analysed from a Massachusetts State College. Two hundred and thirty eight penalties (both minor and major) were observed. An analysis of the data revealed that winning teams showed a higher incidence of aggressive infractions ( $M=8.6$ ) during an average game than losing teams ( $M=6.6$ ). However, these findings were somewhat tempered by the fact that winning teams committed more fouls than losing teams when the margin between the sides were 1-2 goals, or 5 or more goals. Losing teams committed more fouls than winning teams when the margin was between 3-4 goals. Further analyses revealed that teams who played at home performed a significantly greater number of aggressive infractions than teams playing away, and that winning teams performed increasing amounts of aggression across the three time periods of an ice hockey match. In comparison, losing teams displayed an equally high amount of aggression as winning teams during the second time period, but performed a mean number of penalties in the other time periods equal to the aggression shown by winning teams during the first time period.

There are two plausible explanations for these complex findings. Firstly, the sample was particularly small ( $\mathrm{n}=14$ ) which belies Cullen and Cullen's effort to conduct an exploratory study. Cullen and Cullen's sample size is contrasted with Widmeyer and McGuire (1997) who collected and scored 840 matches. The mean number of penalties for one analysis (i.e., time period) was approximately two for each cell. Secondly, the dependent measure was poorly defined as merely minor and major penalties without any attempt by the authors to distinguish between aggressive and non-aggressive infractions (c.f. Widmeyer \& McGuire,
1997). Thus, the authors were utilising a small data set with a dubiously defined outcome measure. Consequently, the findings have questionable validity.

An equally problematic study was conducted by Lefebvre and Passer (1974) who analysed newspaper reports of matches played during the first half of the 1973-74 Belgian Soccer League season. Yellow and red cards, and penalties, served as a measure of aggressive behaviour. Frequency of aggressive behaviours was explored with respect to Factor \#1 (Game result), Factor \#2 (Game location), and Factor \#3 (Game importance, viz, first division versus second division matches). A total of 120 matches were analysed. Chi-square analyses utilising the frequency of yellows cards revealed that: Away teams received more cards than home teams; losing teams received more cards than winning teams; and, finally, teams playing in the first division received more cards than teams playing in the second division. For penalties, there was only one significant result for the game location factor (i.e., losing teams gave away more penalties than winning teams). Red cards were not analysed because of their low frequency.

A shortcoming of this study is similar to that raised about Cullen and Cullen (1975). The authors made the assumption that yellow cards and penalties are aggressive behaviours. However, an aficionado of soccer would quickly suggest that 'professional fouls', where one player commits a foul to prevent an opposing player from scoring or moving the ball towards the goal, are relatively common in this sport, and have little aggressive connotation. For example, Lefebvre and Passer's definition of penalties as aggression would include an outfield player handling the soccer ball within the penalty box. Also, a limitation of this study was that the authors failed to examine the possibility of interactions between the factors by conducting 2 X 2 chi-square tests.

It is interesting to note that a comparison between Cullen and Cullen and Lefebvre and Passer show a direct contradiction in conclusions. Cullen and Cullen showed that winning teams display more aggression than losing teams, whereas Lefebvre and Passer showed that losing teams display a greater number of aggressive acts. Cullen and Cullen also showed that teams playing home were more aggressive than away teams because of the 'must-win-at-
home' philosophy, whereas Lefebvre and Passer found the exact opposite. These comparisons may imply that behavioural differences exist across sports. However, it is more probable that these contradictions are an outcome of the dubious nature of the dependent variables utilised in both studies.

Russell (1983) reported a better controlled study where he analysed 860 matches from the Western Hockey League for the entire 1978-79 season. The purpose of Russell's study was to resolve contradictory evidence (e.g., Cullen \& Cullen, 1975; Lefebvre \& Passer, 1974) on the issue of whether winners or losers produce more aggression during competitive sport. Russell observed that past research composed the independent variable as either winning or losing, rather than a continuum of score differences between the teams (thereby also including a tied match as part of the calculations). Russell argued that a considerable amount of information is lost by dichotomising a game's outcome in terms of a win or a loss. Russell thus calculated game outcome for each team on a continuum composed of 11 points $(<-5,0,>+5)$. Aggression was defined as the total number of penalty minutes incurred by a team for aggressive infractions. Non-aggressive infractions, such as playing with a broken stick, were screened from the data. An analysis of the data showed that a U-shaped function best represented the relationship between the final game score differential and aggression. Teams winning by a large margin ( 5 goals or more) and teams losing by a large margin (5 goals or more) exhibited the greatest amount of aggression. Teams who played in tight contests where they either won or lost narrowly, or drew, exhibited the least amount of aggression.

A reason as to why there exists a U-shaped function between game outcome and aggression was provided by Russell (1983): "When a match is close it is generally regarded as an inopportune time to incur a penalty. Thus, players embroiled in a close match may quite deliberately inhibit their impulses to aggress in the interests of a team victory" (p.175). In contrast:

A crushing defeat occurring in the generally hostile atmosphere of contact sports greatly increases the likelihood of interpersonal aggression being initiated by the
vanquished. However, at no time are the victors exempted from their continuing obligation to meet aggression with aggression. (p. 175)

Even though Russell's data were based on a large sample, and were appropriately screened for aggressive responses, the interpretation that losers exhibit aggression because they are being beaten easily, and winners retaliate, is not based on empirical evidence. Wankel (1973) argued along different lines when he suggested that teams produce instrumental aggression early in a match (or early in the season) in order to intimidate the opponent and thereby maximise the probability of winning. In contrast, losing teams exhibit a greater amount of non-instrumental aggression during the later stages of a match or season as a form of retaliation to instrumental aggression exhibited by winning teams. This logic differs from Russell's argument because eventual winners behave aggressively in order to maximise the probability of beating the opponent, while losers retaliate with non-instrumental aggression later in the match when frustrated at being beaten.

Widmeyer and Birch (1984) examined the plausibility of Wankel's theory. Data were analysed from 1176 NHL matches during the seasons of 1956-57, 1961-62, 1966-67, and 1971-72. An aggressive infraction was identical to that utilised by Widmeyer and McGuire (1997). Aggression committed early in a match was defined as infractions occurring in the first period, whilst aggression committed late in a match was defined as infractions occurring in the third period. Likewise, aggression occurring early in the season was defined as infractions occurring in the first third of the season, and aggression occurring late in the season was defined as infractions occurring in the final third of the season. A correlational analysis showed that aggressive penalty minutes incurred during the first period of a match were significantly associated with team performance across all four seasons. That is, aggression was higher during the first period of a match if a team ended up winning the match. Likewise, there was a negative relationship between aggressive penalties incurred during the final period of a match and winning. That is, losing was associated with higher number of infractions during the final period of a match. However, even though the
correlation was of a moderate effect size ( $r=-.28$ ), the latter relationship was not significant. Neither of the correlations of aggressive penalty minutes and points accumulated per game, during the first and final periods of the season, were significant.

Thus, Widmeyer and Birch (1984) have shown that aggressive infractions during the first and final periods of a match are associated with performance. However, the question must be asked as to why the seasonal data failed to reach significance. Widmeyer and Birch suggest that with a sample size of six teams for three of the four sampled seasons, the degrees of freedom were extremely low which reduced the likelihood of finding a significant correlation. Another shortcoming of the study, which the authors failed to mention, was the apparent failure to segregate the aggressive infractions into instrumental and non-instrumental behaviours. A better controlled study would have entailed the development of a schedule which categorised all aggressive infractions into either instrumental or non-instrumental behaviours, rather than lump all aggression into a single category as if they were all the same.

Finally, Russell and Drewry (1976) conducted a study based on matches from a Canadian ice hockey league (Alberta Highwood) for the seasons 1970-71 and 1971-72 in which they examined Factor \#1 (i.e., game outcome), Factor \#3 (i.e., time period of match), Factor \#4 (i.e., period of the season), Factor \#5 (i.e., league standing; absolute \& relative), and Factor \#8 (i.e., crowd size). An interesting feature of this study was the use of archival records of matches, completed by game officials, which is unlike the conventional approach of directly observing matches and measuring aggression with respect to a pre-defined construct. A unique feature of this data set is that aggression was correlated with the actual differential score when the infraction was committed. This should be contrasted with methods used by other authors who correlated total mean number of infractions during a match with the final game score differential (e.g., Russell, 1983).

An examination of these data showed that crowd size was positively correlated with aggression such that the relationship was best represented as curvilinear. That is, the larger the crowd, the more aggression (at an increasing rate) shown by players. However, this relationship was only found for the second season of play. Period of play was associated with
infractions such that aggression increased over the course of an average match. Relative league standing was not related to infractions, but absolute league standing was related to infractions in that aggression increased as a team was higher placed in the league, except for the top placed team which exhibited aggression equivalent to a lower placed side. There was no association between level of infractions and period of the season (a finding which replicates Widmeyer \& Birch, 1984).

Russell and Drewry (1976) also replicated the findings of Russell (1983) who showed that infractions and score differential were best represented by a U-shaped function. It is a significant point that Russell and Drewry correlated infractions and game score differential at the time the infraction was committed, whereas Russell demonstrated the association using the final game score differential. That is, the authors reached similar results using different approaches. In contrast, there is a general inconsistency between the U-shaped function presented here and the findings of the previous sections (i.e., laboratory-based studies). Recall that Epstein and Taylor (1967) and Merrick and Taylor (1970) showed that competitive aggression under Taylor's reaction time procedure was greatest when the subject was winning approximately half of the trials (and provocation from the opponent was at a maximum). However, Russell (1983) and Russell and Drewry (1976) have shown that aggressiveness is lowest during tight matches i.e., when scores are tied. A likely explanation for these inconsistent findings is the context and nature of the aggressive acts, viz, naturally occurring versus laboratory-based behaviours.

While the findings reported by Russell and Drewry (1976) tended to replicate past findings, there were a number of shortcomings of this study. Firstly, the sample size was relatively small (i.e., six-team league for two seasons). Secondly, there was no demarcation made between infractions of an aggressive and non-aggressive nature. Finally, the authors were utilising data derived from archives in which it was assumed that records by match officials were accurate accounts of each game's events.

In sum, Widmeyer and McGuire (1997) demonstrated that frequency of competition between professional ice hockey teams results in a higher level of non-instrumental
aggressive infractions, while Widmeyer and Birch (1984) revealed that teams who display aggressive infractions in the early part of a match subsequently win, which represents instrumental aggression, and that losing sides are more likely to display non-instrumental aggression in the late stage of a match as a retaliative or frustrating act. Russell (1983) and Russell and Drewry (1976) demonstrated that aggression and game outcome are best represented by a U-shaped function. Further research, using better controlled methods, however, are required to support these preliminary findings. Ice hockey is a violent sport by nature, although hockey is less violent. Research on other sports is required to extend the generalisability of these findings beyond the limited number of sports analysed in the literature thus far.

### 3.3.4 Summary of the findings

An immediate observation about the body of evidence is the paucity of studies on competitive aggression. A total of merely 41 independent studies have been conducted on this topic. The overwhelming majority of studies have used Taylor's competitive reaction time procedure ( $\mathrm{n}=28 ; 68 \%$ ), whilst fewer studies are laboratory-based ( $\mathrm{n}=6 ; 15 \%$ ) or use naturalistic designs ( $\mathrm{n}=7 ; 17 \%$ ). A major limitation of Taylor's procedure is that there is rarely a comparison made between increasing levels of competition, or between competitive and cooperative situations. The procedure is primarily tailored for exploring situational (e.g., audience, increasing opponent provocation) and personality (e.g., locus of control, aggressive disposition) factors that mediate competitive aggression. There is value in exploring the types of situational and personality factors that mediate competitive aggression, however, these studies provide only suggestive evidence that competition leads to or causes aggressive behaviour.

A close examination of the sample characteristics reveals that the majority of studies have reported data based on undergraduates (e.g., Anderson \& Morrow, 1995; Deutsch, 1949b; Grossack, 1954; Raven \& Eachus, 1963), a lesser number on children (Nelson et al., 1969;

Rocha \& Rogers, 1976), and one study on adolescent participants (e.g., Sherif, 1972). In fact, nearly all the studies using Taylor's reaction time procedure used university students. Moreover, a few studies have explored the nature of professional or amateur sports matches (e.g., Widmeyer \& Birch, 1984). Likewise, there is an imbalance in the exploration of competitive aggression for males and females. Thirty-one studies (76\%) reported data based on a male sample only, 4 studies ( $10 \%$ ) were based on females only, and 5 studies ( $12 \%$ ) used males and females. ${ }^{14}$ Nearly all of the studies were conducted in North America, and no data have been reported from Australia.

An examination of the methodologies utilised across the studies reveals a diversity of tasks. Tasks utilised included: puzzle solving (Deutsch, 1949b); a human relations problem (Grossack, 1954); an abstract motor task (Raven \& Eachus, 1963); tournament situation (Sherif, 1972); professional competition (e.g., Russell, 1983); a competitive reaction time task (e.g., Taylor, 1967); block building (Rocha \& Rogers, 1976); videogame play (Anderson and Morrow, 1995); and sport activities (Nelson et al., 1969). Both means-interdependent and means-independent tasks have been employed across these studies.

Measures of aggressive behaviour have also been quite diverse. These have included: play behaviour (Nelson et al., 1969; Rocha \& Rogers, 1976); verbal communication (Deutsch, 1949b); written communication (Grossack, 1954); electric shock (e.g., Epstein \& Taylor, 1967; Gaebelein \& Taylor, 1971; Taylor, 1967); the 'kill ratio' based on videogame play (Anderson \& Morrow, 1995); and infractions during sports matches (Cullen \& Cullen, 1975; Lefebvre \& Passer, 1974; Russell, 1983; Russell \& Drewry, 1976; Widmeyer \& Birch, 1984; Widmeyer \& McGuire, 1997). Some studies have measured actual (Anderson \& Morrow, 1995; Sherif \& Sherif, 1969) or hypothetical (Raven \& Eachus, 1963) hostility. In spite of the diversity of measures, there have been only a few attempts at validation (e.g., Widmeyer \& Birch, 1984; Widmeyer \& McGuire, 1997). There has been only one study on the effects of

[^20]competition on participant's angry feelings (Shortell et al., 1970), despite the fact that anger is clearly defined in conceptual research.

All authors provided a clearly articulated theory or rationale for their study, although current aggression theories were tested in one study only (i.e., Anderson \& Morrow, 1995).

Most studies appropriately focussed on the issue have supported the notion that competition leads to aggressive behaviour or hostility. Some studies have failed to demonstrate the link between competition and aggression (e.g., Gaebelein \& Taylor, 1971; Nelson et al., 1969), but these investigations have almost invariably employed poor methodologies. Cooperation has been found to mitigate the link between competition and aggression (Deutsch, 1949b; Grossack, 1954; Raven \& Eachus, 1963), particularly situations involving 'superordinate goals' (Sherif \& Sherif, 1953, 1969). Studies examining the potential association between personality factors and the putative link have shown that competition elicits higher aggression amongst persons with a highly aggressive disposition (Rocha \& Rogers, 1976), and a range of other individual difference factors from Taylor's procedure such as hostility (Ohbuchi, 1982; Taylor, 1967), need for approval (Taylor, 1970), anxiety (Dengerink, 1971), locus of control and field dependence-field independence (Dengerink et al., 1975), depression (Dengerink \& Myers, 1977), and gender (Hoppe, 1979; Shortell \& Biller, 1970; Taylor \& Epstein, 1967). There have been some inconsistencies in the findings (e.g., sporting matches versus shock studies), but these inconsistencies have probably resulted from the large variation in methodologies.

Based on the literature review, a set of summary statements are proposed pertaining to the competition-aggression link. These are:

1. There is a paucity of convincing research on the competition-aggression link. A consistent methodological shortcoming has been the failure to validate the outcome measure of aggression;
2. Most studies (outside of Taylor's reaction time procedure) show that competitive situations induce verbal and physical aggression amongst participants, as well as hostility (relative to less competitive or cooperative situations);
3. There has been one study only on participants' angry feelings;
4. The competition-aggression link has been demonstrated on children and adults. There is only one reported study on adolescents;
5. The link has been shown using males and females, although research on females has been limited;
6. There is no Australian evidence on this issue. Most studies have been conducted in North America;
7. Competition induces aggression in winners and losers, although aggression is probably non-instrumental for the latter group. Moreover, losers tend to demonstrate more aggression when in a laboratory-based situation;
8. Studies examining personality differences show that individuals with high trait aggression are more likely to behave aggressively during competition. Taylor's reaction time procedure has revealed that a number of personality factors influence competitive aggression. Generally speaking, competitive aggression is highest amongst individuals with a hostile disposition, low need for approval, low anxiety, internal locus of control, and a depressive disposition. Males display more competitive aggression, as well as masculine individuals (as measured by Bem's Sex Role Inventory);
9. There are a number of situational factors that increase competitive aggression such as audience presence, audience pressure, increasing or maximum provocation from the opponent, task failure, rewards (both for acting aggressively and winning), behavioural compliance, and a male opponent; and
10.Aggression or hostility persists beyond the competitive situation, although the effect is probably setting bound.

Figure 1.1 attempts to illustrate the conceptual underpinning of studies examining the validity of the competition-aggression link. Having reviewed the literature, we can begin to surmise as to the factors that maximise the overlap between the circles, viz, Setting, Person, and the Media.

There is little information about factors relevant to Media because there has been only one study reported using videogames (Anderson \& Morrow, 1995). The videogame utilised to demonstrate the competition-aggression link by Anderson and Morrow is non-violent because Super Mario Brothers has a ' $G$ ' classification from the Australian Office of Film and Literature Classification i.e., it is recommended for audiences of all ages. This implies that the link may be shown using even non-violent content videogames. However, further research is required to test whether Super Mario Brothers and other videogames represent aggressive behaviour (as suggested by appropriate validation procedures) and are perceived as violent by a range of participants.

In contrast, there is more information on Setting factors. Most studies employed a methodology in which the competitive situation was meaningful to participants. For example, Deutsch (1949b) and Grossack (1954) used a problem solving situation with university undergraduates, Sherif and Sherif $(1953,1969)$ used a tournament of preferred games amongst adolescent boys, and Rocha and Rogers (1976) used a block building exercise with children. While Taylor and his colleagues have utilised a contrived competitive situation, the findings have been generally consistent, although they have also been complicated at times. In addition, another methodological characteristic is that the utilised reward has been salient for participants. Deutsch (1949b) and Grossack (1954) offered an automatic A-grade pass on a term paper for university students, Sherif and Sherif $(1953,1969)$ used coveted knives and money as prizes for adolescent males, and Rocha and Rogers (1976) showed that very attractive rewards, as perceived by children, produced more competitive aggression than a less attractive reward. A conceptual analysis showed that a means-interdependent task increases the likelihood of demonstrating the link. Borden and Taylor (1973) have shown that the mere presence of an audience increases participants' aggression, and persuasion from an
audience can either decrease or increase aggression (depending on the type of persuasion from the audience). Rocha and Rogers (1976) showed that limited resources for a task increase the likelihood of aggressive behaviour. There are a host of other situational factors that increase aggression such as frequency of competition (Widmeyer \& McGuire, 1997), level of provocation from an opponent (Gaebelein \& Taylor, 1971; Taylor, 1967), level of task frustration (Raven \& Eachus, 1963), degree of success (Merrick \& Taylor, 1970; Russell, 1983; Russell \& Drewry, 1976; Shortell et al., 1970), crowd size (Russell \& Drewry, 1976), and league standing (Russell \& Drewry, 1976). The type of aggression performed by participants can alter during different periods of a competitive situation (Widmeyer \& Birch, 1984).

Research relevant to Person factors reveal a host of personality or individual difference factors that increase competitive aggression. These have been outlined above within the summary statements and will not be re-iterated here. It is sufficient to say that the competition-aggression link is mediated by a number of personality factors which are brought into the experimental situation by an individual.

### 3.4 Conclusions

This chapter has critically reviewed 41 studies devoted to the competition-aggression link. While the body of evidence is relatively small, a preliminary set of statements were derived from the literature that summarise the general characteristics of the body of knowledge. Further research is required to expand our current knowledge of this field and to test the plausibility of the summary statements proposed in the preceding section. A striking feature of the literature is that it spans over fifty years, with only a few studies reported in the last 10 years, and there has been very little work using current theoretical positions from the aggression field. There is considerable scope for psychologists to integrate the findings from the competition-aggression field within the broader field.

In sum, the purpose of the current thesis is to report research on the competitionaggression link in order to expand our current knowledge on the topic. To this end, a series of studies have been conducted on adolescents because there is a paucity of research on this age group, and these studies were conducted in Australia as past research has been conducted in North America alone. In addition, there has been some attempt to test the plausibility of theories of the competition-aggression link as a means of providing a theoretical impetus behind the putative effect. Thus, participants' angry feelings have been measured in order to fill a knowledge gap on this concept within the paradigm.
$1$

## CHAPTER 4

## Theories of the Competition-Aggression Link: CAST and/or CANT

### 4.1 Introduction

Whilst a reasonable amount of knowledge has been generated on the competitionaggression link, few studies have explored a contemporary theoretical explanation for this phenomenon. In spite of this situation, there are several theories from the aggression field that provide plausible interpretations as to why competition leads to aggressive behaviour, and how these behaviours are mediated by affect and cognition. Anderson and his colleagues have provided a useful model that integrates these plausible theoretical accounts (Anderson, 1994; Anderson, Anderson, \& Deuser, 1996; Anderson et al., 1995). This chapter will outline this model, and then argue that two theories from Anderson's framework are equally plausible explanations of the competition-aggression link. It will be argued subsequently that further research is required to test the empirical weight of each theory.

### 4.2 Anderson's Model of Aggression

Working primarily on the temperature-aggression hypothesis (i.e., the notion that hot and cold temperatures increase the probability of aggression), Anderson and his colleagues have integrated several theories of aggression in order to provide a framework of situational variables and their relationship to psychological processes and aggressive behaviour (Anderson, 1994; Anderson et al., 1996; Anderson et al., 1995). The framework deals specifically with the current state of the individual and does not cover the development of individual differences or personality factors (Anderson et al., 1996). Anderson et al. (1996) write: "We focus on the processes by which various basic inputs can be transformed through a series of stages to an increase in the anger/hostility experience and eventually to aggressive behavior" (p. 366). The authors observe that a range of situational variables have been scientifically reported as antecedents of anger, hostility, and aggressive behaviour. These disparate factors include hot and cold temperatures, insults, unpleasant aromas, visual images of guns, frustrating events, strenuous exercise, and offensive pictures. Anderson et al. (1996) propose that situational variables can activate one (or more) of three psychological routes. These psychological routes, each of which implies a different theory of aggression, are:

1. Cognitive,
2. Affective, and
3. Arousal state.

The cognitive, affective, and arousal, routes operate independently of each other, although the psychological pathways can overlap (Anderson et al., 1995). An in-depth outline of each theory of aggression will reveal the manner in which these pathways overlap. Incoming information is processed in the first instance on the basis of the activated psychological route. For example, an uncomfortably hot environment activates negative affect that increases the
likelihood of hostile feelings towards a person who arbitrarily insults an uncomfortable individual. This is called a 'primary appraisal' and is usually automatic: "People interpret both the current situation and their own affective state quickly, with particular reference to harm, intent, and malice, as well as feelings of anger" (Anderson et al., 1995, p. 436). Primary appraisals lead to further appraisal when (and if) an individual has both the time and the cognitive resources. During the reappraisal stage, behavioural options are evaluated in a more thoughtful and effortful manner, with consideration given to the likely consequences of each action.

There are also important qualifications with respect to this framework (Anderson et al., 1996). Firstly, an input variable may influence more than one route. For example, competition may increase aggression through the negative affect route and also the cognitive route (depending on environmental stimuli and events, personality factors, and/or individual differences). Secondly, situational variables may interact to produce a unique experimental effect. The framework does not imply that all input variables act independently of each other. Finally, the framework does not specify the association between specific input variables and each route. Anderson et al. (1996) appropriately conclude that:

Future work should be directed at exploring a wide range of basic input variables and how they exert their influence. .... This general framework has been extremely helpful in guiding our work; we believe that others will similarly benefit from such an overall model. (p. 375)

This thesis is guided by Anderson et al.'s exhortation to explore the influence of situational factors (e.g., competition) on aggressive behaviour.

Anderson et al. $(1996,1995)$ tested the idea that there are separate psychological pathways to aggression by conducting several experiments on situational variables. For example, Anderson et al. (1996) conducted a study on the effects on cognition/affect of hot and cold temperatures, and exposure to violent stimuli. Undergraduate participants were randomly
allocated to rate a series of pictures which were either aggressive (i.e., guns) or neutral (i.e., nature scenes). Later, participants were randomly assigned to three rooms of varying temperature i.e., uncomfortably hot or cold, or a comfortable temperature. Participants were requested to complete a Stroop exercise, when they were in this room, where they had to identify the colour of a word as quickly as possible. Words were either aggressive or nonaggressive. Reaction times were recorded. Finally, participants completed questionnaires that were designed to measure hostile feelings and attitudes, and negative and positive affect.

An analysis of these data supported the hypothesis that situational factors operate through different routes. Participants placed in a hot or cold room reported significantly greater feelings of hostility, negative affect, and hostile attitudes, than participants in the comfortable room, while the photo prime of aggressive pictures did not influence these constructs. Moreover, participants primed with pictures of guns took significantly longer to name the colour of aggressive words during the Stroop test relative to non-aggressive words, whilst those in the neutral picture group took equally long to name the colour of aggressive and nonaggressive words. The authors cited research that shows a performance interference effect on the Stroop test when cognitive constructs are elicited before the task is undertaken. During the Stroop test, the elicitation of an aggressive schema from viewing guns conflicted with the identification of the aggressive word's colour. Overall, this study showed that violent stimuli elicit thoughts and memories of aggression, while extreme temperatures elicit feelings and attitudes of hostility.

### 4.3 Pathways Potentiated by Competitive Situations

Operating from Anderson's framework of aggression, it is the contention of this thesis that there are two plausible routes of aggression during competitive situations, viz, cognitive and affective pathways. The arousal route is excluded from this analysis because it is clearly the
least plausible of the three pathways. This route is based on Zillman's excitation transfer theory which proposes that neutral physiological arousal can be transferred into anger-related experiences and increase the likelihood of aggression (Zillman, 1978; Zillman \& Johnson, 1973; Zillman, Johnson, \& Day, 1974). For example, in an oft-cited study, Zillman and Johnson showed that subjects were more punitive towards an antagonist if they had previously watched a sexually arousing movie, relative to subjects who had been watching a violent or neutral film. Anderson et al. (1995) suggest that excitation transfer most probably takes place when physiological arousal has been heightened but perceptions of that arousal are low. Excitation transfer theory is not a logical explanation of competitive aggression since it implies that competition heightens neutral physiological arousal that transfers into anger-related experiences during or after the competitive situation. This theory is based on the tenuous assumptions that competitors' perceptions of their physiological arousal is low, and that experiences thereafter are antagonistic. More importantly, it assumes that competition elicits a neutral physiological arousal within the competitor (and this is an empirical question that requires testing). Thus, it is concluded that the most logical pathways to aggression are cognitive and/or affective. The following sections outline these theories in greater detail and evaluate their relative explanatory power with respect to the competitionaggression link.

The first theoretical account of the competition-aggression link is the schema-activation (e.g., Geen \& Thomas, 1986), knowledge structure (Anderson \& Morrow, 1995; Sedikides \& Anderson, 1992), or associative network (e.g., Berkowitz, 1989, 1990) theories. For ease of understanding, this position will be referred to as the competition-aggression schema theory (or CAST). This theory operates from the concept that there are (metaphorically speaking) schemas within people's minds which are composed of nodes and links (Collins \& Loftus, 1975; Lakoff, 1987). The nodes, which are built from experience, are packets of information, while the links, which are also formed from experience, are semantic connections between the nodes. When an element within an associative network is stimulated, other related elements
within the network are activated via a spreading effect (Collins \& Loftus, 1975). This cognitive process is called 'priming'.

CAST suggests that there is a schema composed of nodes of ideas, thoughts, emotions, and memories, of competition, which are associatively linked with nodes of ideas, thoughts, emotions, and memories, of aggression. It is the socialisation process within Westem culture that forges the link between the competition schema and the aggression schema (Anderson \& Morrow, 1995; Deutsch, 1993). Anderson and Morrow (1995) have eloquently described this process:

Certainly, one general lesson most people learn is that competition is necessarily aggressive. We learn this both in the relatively positive sense of being assertive and in the more negative sense of inflicting harm. One need only attend a football game or a debate and listen to the contestants, coaches, and spectators to get a feel for how all view the contest as the proper scene for inflicting physical or psychological harm on the opponents. Participants are expected to trounce, destroy, or blow away their opponents, figuratively if not literally. (p. 1021)

This theory implies that the mere thought or idea of being in a competitive situation has the potential to stimulate the competition schema which spreads to the surrounding aggression schema. That is, competition increases the probability of aggression because the competition and aggression schemas are semantically linked within a person's memory.

Bushman $(1995,1996)$ has published innovative work based on individual differences in the development of the aggressive schema. Although this theoretical and empirical work is not directly applicable to CAST, it nevertheless provides invaluable insight on the importance of considering personality factors with respect to the competition-aggression schema. Bushman mentions two concepts that are relevant to this topic, viz, 'priming' and 'chronic accessibility'.

Priming is the process whereby an environmental stimulus (e.g., violent television images) activates a schema (e.g., aggression) and consequently increases the probability of further incoming information being interpreted using the primed construct. For example, Berkowitz \& Geen (1966) revealed that subjects were more aggressive towards a confederate if they had previously watched a violent movie, and were highly aggressive if the confederate's name was identical to the protagonist's name.

In contrast, chronic accessibility refers to the sensitivity of a schema with respect to environmental stimuli. Bushman (1998) writes: "Repeated or frequent activation of a construct could result in a lowered threshold of activation, making a construct chronically accessible" (p. 538). Personality factors are particularly pertinent to the concept of chronic accessibility to the extent that the aggression schema is more likely to be primed by violent stimuli amongst certain personality types. Bushman (1996) reports data supporting the concept of chronic accessibility by showing that high-trait aggressive individuals (and males) have a more developed aggression schema than low-trait aggressive individuals (and females). Further support for chronic accessibility has been reported by Bushman (1995) who showed that high-trait aggressive individuals were more likely to choose violent films to watch, and reported feeling more angry and behaved more aggressively after watching a violent film, than low-trait aggressive individuals.

Bushman's research is highly consistent with the violent television field which has systematically shown that high-trait aggressive individuals are more likely to watch violent television at an early age, and behave more aggressively during adulthood (Huesmann, Eron, Lefkowitz, \& Walder, 1984). It should be emphasised here that there is no implication about what factors are the cause and what factors are the effect, as the process is probably reciprocal (Olweus, 1979, 1980), and influenced by other factors e.g., child-rearing practices (Huesmann \& Eron, 1986; Sanson, Smart, Prior, \& Oberklaid, 1993). However, the main point is that some personality types are conducive to search for, and be primed by, aggressive stimuli.

If Bushman's personality research is extrapolated to CAST, it could be argued that there are individual differences in the accessibility of the competition-aggression schema. Research
is required to test this assertion, although it would appear logical to suggest that individuals with a developed aggression schema are more likely to possess stronger links with the competition schema.

The second theoretical account of the competition-aggression link is based largely on Berkowitz's cognitive neo-associationistic theory (Berkowitz, 1989, 1990; Berkowitz \& Heimer, 1989), and less so on Bell's negative-affect model (Anderson \& DeNeve, 1992; Baron \& Bell, 1976; Bell, 1992). This position will be referred to as the competitionaggression negative-affect theory (or CANT). This theory operates from the assumption that competition is frustrating because participants are striving for the same goal and thus providing a threat to each other's goal attainment (Berkowitz, 1989). Frustrating situations are aversive and (by that fact) are able to generate a feeling state called negative affect. Thus, competition is no different to other stimuli that generate negative affect e.g., foul odours, high temperatures, cold water, and offensive pictures (Berkowitz, 1990). Since negative affect is uncomfortable to an evolved organism, there is an innate tendency to reduce this feeling state by either flying or fighting. Berkowitz (1989) explains how fear and anger are connected to these innate tendencies:

The experience of fear presumably accompanies the escape/avoidance tendencies and theoretically develops out of ideas, memories, expressive-motor reactions, and physiological sensations associated with escape/avoidance, whereas the experience of anger theoretically goes along with the aggressive tendencies and is built from aggression-related ideas, memories, expressive-motor responses, and bodily sensations. A variety of factors - genetic, leamed, and situational - supposedly determine the relative strengths of the two tendencies and their associated feelings, thoughts, and memories. (p. 69)

Berkowitz (1983) adds that cognitive factors play an important role in determining behavioural choices (and even an emotion) during an aversive experience:

It is in these later stages that the affected person makes appraisals and causal attributions and considers what feelings and actions are appropriate under the particular circumstances. This additional thought leads to the differentiation, intensification, suppression, or elaboration of the early rudimentary experiences. If the afflicted person's arousal level is weak, for example, they may decide at this time that they are irritated or annoyed rather than angry. Or as cognitive/attributional theorising proposes, afflicted persons may come to believe that they are, for example, sad and not angry, because they believe that one does not feel anger in this particular situation. They may even develop relatively complicated emotional experiences such as anxiety, contempt, envy, guilt, and even depression. (p. 297)

An important feature of this theory is its overlap with schema theory since it is argued that aggression is produced from an associative network or schema. However, the fundamental difference between the two positions is that the former theory proposes that situational variables potentiate the aggressive schema directly (i.e., cognitively), while the latter theory suggests that situational variables initially elicit negative affect which, in turn, activates the aggressive associative network. Moreover, an implication of the cognitive neoassociationistic theory is that the processes are innately derived, regardless of the overriding influence of socialisation.

The CANT interpretation of the competition-aggression link derived from Berkowitz's theory has a high degree of explanatory power. Berkowitz (1989) explains why competitive situations sometimes lead to aggression:

Competitive encounters are at least partly frustrating as the contestants block each other's attempts to reach the disputed goal and threaten each other with a total loss. .... In many instances the competition follows accepted rules so that whatever frustration occurs is largely justified. Nevertheless, even though the competitors often
thwart each other legitimately, not infrequently they also become somewhat hostile to each other, disparaging each other and even at times trying to hurt each other. (p. 66)

In fact, winners are not immune to the frustrating influence of competition. Berkowitz (1989) suggests that winners may also display aggression because the positive affect generated from victory does not necessarily override the negative affect generated by being in a frustrating competitive situation. Losers, however, are struck with the double blow of frustration and defeat. While losers are most likely to produce aggression, because of a high state of negative affect, winners still have the residual bad feeling of competition.

### 4.4 Which theory is the best explanation?

An issue that requires consideration at this point is the status of each theory as plausible explanations of the competition-aggression link. An examination of the literature shows that only one study has evaluated the validity of these theories under the same experimental procedure (Anderson \& Morrow, 1995) and found that videogame aggression, as demonstrated by competitive subjects, was accompanied by an absence of hostile feelings or negative affect i.e., 'affectless' aggression. Anderson and Morrow's data thus provides evidence for CAST over CANT.

However, there are several reasons as to why these findings are not conclusive. Firstly, the review of Anderson and Morrow (see Section 3.3.1) showed that the authors did not validate the 'kill ratio' construct as a measure of aggression implying that a validation process is still required to substantiate these findings. Secondly, it is difficult to envisage any competitive situation as non-frustrating because the mere definition of competition entails individuals or groups striving against each other for a desired reward (whether intrinsic or extrinsic). This is not to say, however, that all competitive situations are frustrating since one could argue that
an experienced sportsperson may learn to reduce or minimise their affective response (by staying 'cool under pressure') in a competitive match to maximise the probability of winning. Rather, this point emphasises that (at least) some competitors will be frustrated during a competitive situation and that the contextual basis of the situation may provide relevant information as to the likely cognitive and behavioural outcomes. This suggestion (of the potential contextual basis of the competition-aggression link) is complemented by Anderson's aggression model which holds that the cognitive and affective routes provide equally legitimate explanations of aggressive behaviour. Thus, it is not an issue of CAST or CANT. Rather, it is an issue of CAST and/or CANT. Research is required to test the relative empirical validity of both theories across a diverse set of experimental situations with consideration given to the experimental factors that led to the effect.

Therefore, since there is little research that has directly tested the plausibility of each theory, the purpose of this thesis is to fill this knowledge gap. That is, an attempt will be made to demonstrate the competition-aggression link and to evaluate the empirical strength of each theoretical explanation of this putative effect.

### 4.5 Conclusions

The purpose of the current chapter was to outline Anderson's model of aggression in order to provide a framework for understanding the competition-aggression link. There are two theoretical explanations from this framework that are most applicable to the putative link, viz, CAST and CANT. However, there has been only one study that has pitted each theory against the other as the most plausible explanation. This dearth of research prompts additional investigations into the empirical strength of each theory across a diverse number of contexts (e.g., experienced versus inexperienced competitors). The current thesis attempts to fill this knowledge gap by providing a relevant study on this theoretical issue.

## CHAPTER 5

# Adolescent Videogame Play Does Not Differ Across Competitive and Cooperative Situations Using Anderson and Morrow's (1995) Methodology 

### 5.1 Overview

This chapter reports a series of studies that attempt to demonstrate the competitionaggression link under relatively contrived competitive and cooperative situations. The methodological procedures of this chapter are based on studies reported by Anderson and Morrow (1995) on US university students. The present studies were based on adolescents in order to fill a knowledge gap on this age group. Replicating the findings of Anderson and Morrow would extend the competition-aggression link from US university students to Australian adolescents. Given the sample differences across the studies (e.g., age group, cultural factors), a failure to replicate these findings would not necessarily invalidate Anderson and Morrow's data.

Recall that Anderson and Morrow conducted two studies. Experiment 1 tested the underlying assumption that humans perceive competitive situations as aggressive, and
cooperative situations as less aggressive. A questionnaire was administered to seventeen university students in order to evaluate the structure of the competition and cooperation schemas with respect to aggressive elements. On the whole, the authors' hypotheses were supported by these data. For example, on one test, participants were requested to think of competitive situations they had encountered in the past and write words that described those situations. Participants also had to think about cooperative situations and write words to describe those situations. The findings revealed that participants wrote a significantly greater number of aggressive words, and a significantly lesser number of non-aggressive words, to describe competitive situations when compared with responses of cooperative situations.

During Experiment 2, 60 university students were paired and assigned to either a competitive or a cooperative condition. Participants either played separate games (i.e., competitive group) or the same game (i.e., cooperative group). Participants were placed into either same- or mixed-sex dyads. The utilised videogame was Super Mario Brothers, c.1987. Based on the assumption derived from Experiment 1, that university students possess a competition schema containing aggressive elements, it was hypothesised that competitive participants would demonstrate a greater inclination to kill encountered adversaries during game play, relative to cooperative participants. The dependent measure (which represents aggression) was the 'kill ratio' (see Section 2.4 for a full description of the kill ratio). The kill ratio is defined as the number of encountered videogame adversaries the participant kills divided by the total number of adversaries encountered (i.e., killed plus avoided).

An analysis of kill ratio data supported the hypothesis that competition would increase aggressive videogame play. Participants in the competitive group had a significantly higher kill ratio ( $M=.66$ ) when compared with the cooperative group ( $M=.41$ ). From a theoretical perspective, an enlightening finding was that the aggression demonstrated by the competitive group was not accompanied by greater levels of reported hostility (i.e., the aggression was 'affectless') because they were no more hostile after the playing period than those in the cooperative group. That is, the authors found evidence supporting a purely cognitive basis for the competition-aggression link (i.e., CAST).

Study 1 of this chapter replicated the findings of Anderson and Morrow (1995; Experiment 1) that people perceive or interpret competitive situations as aggressive, and that cooperative situations are perceived or interpreted as relatively less aggressive. Data for this study were collected during July, 1995. Study 2 attempted to replicate Anderson and Morrow (1995; Experiment 2) who demonstrated that competitive participants had a higher kill ratio than cooperative participants. Data for this study were collected during September, 1995. An identified weakness of Study 2 was the utilisation of a videogame (i.e., Super Mario Brothers) that was relatively old and probably engendered little intrinsic interest for an adolescent sample. Study 3 used a recently released videogame (i.e., Donkey Kong Country). Data for this study were collected during February-March, 1996. Study 4 employed a repeated measures design in order to account for pre-existing kill ratio differences between the competitive and cooperative groups. Data for this study were collected during AugustSeptember, 1996. The findings across the studies were discussed with detail given to the methodological design employed in this chapter and that based on past research.

### 5.2 Study 1:

## Competition and Cooperation Schemas (A questionnaire study)

### 5.2.1 Introduction

An exploration of the competition-aggression link entails a perceptual understanding of the competition and cooperation schemas. An appropriate test of the competition-aggression link is manipulating a situation so it is either cooperative or competitive, and measuring whether aggression varies across these groups. However, from a theoretical perspective, showing that people think of competition as aggressive, and cooperation as less aggressive, provides a
rudimentary explanation for people's behaviour, viz, a cognitive construct that mediates the relationship between a situational variable and an outcome measure.

The methodology employed by Anderson and Morrow (1995; Experiment 1) was utilised in the current study with the only exception that participants were adolescents. Replicating the findings of Anderson and Morrow would generalise the effect across age groups and/or cultural contexts. Since the subsequent studies in this chapter attempt to demonstrate the competition-aggression link using a videogame task, differences in the schemas were examined for low- and high-frequency videogame players, and males and females. These analyses are based on research showing that males (and high-trait aggressive individuals) have more developed aggressive associative networks (Bushman, 1996), and are more likely to watch violent television, and behave aggressively after viewing violence (Bushman, 1995), than females (and low-trait aggressive individuals). While Bushman's research is not directly applicable to the current study, an implication is that males (and high frequency players) may have a greater tendency to link competition with aggression. Research on the competitionaggression link shows that high-trait aggressive individuals display greater levels of aggression during competition than low-trait aggressive individuals (e.g., Rocha \& Rogers, 1976; Taylor, 1967) which, again, implies potential relationships between the competitionaggression schema and variables such as gender and playing frequency.

It was hypothesised that participants would interpret competitive situations as aggressive, and cooperative situations as significantly less aggressive. No predictions were made in relation to sex and playing frequency.

### 5.2.2 Methodology

## Participants.

Participants were 101 high school students. The mean (SD) age of this sample was 13.6 years ( 0.84 ) with a range of 12 to 16 . The sample was composed of 40 females and 61 males.

## Materials.

A survey comprising two sections was designed for the current study. (See Appendix A for a copy of this survey.) The first section, called the General Information Questionnaire (GIQ), was divided into two parts. The first part contained a number of questions on personal factors such as age, sex, and year level. The second part elicited information about the frequency that the respondent played videogames, and the length of time spent playing during each session. These questions were repeated for a variety of settings e.g., the arcade parlour, on a games system (e.g., Sony Playstation, Super Nintendo) or personal computer, at home or at a friend's house. The second section of the survey contained two questionnaires from Anderson and Morrow (1995), viz, the Common Features Questionnaire (CFQ), and the Dimensional Ratings Questionnaire (DRQ). Both questionnaires were designed to measure the extent to which competitive and cooperative situations are interpreted or perceived as aggressive. The respondent is requested in the CFQ to imagine being in a competitive situation, drawing from past experience if necessary, and listing words (at least 3 but no more than 10 words) indicative of competition. This exercise is repeated for cooperative situations. The DRQ contains six words (i.e., forceful, aggressive, hurtful, destructive, exciting, and pleasant) which are rated with respect to competitive situations (e.g., "How forceful is competition?"). The same six words are repeated for cooperative situations (e.g., "How forceful is cooperation?"). Ratings are made on a 5 -point scale. For both the CFQ and DRQ, the items were counterbalanced. That is, the competitive questions were presented before the cooperative questions on approximately half the surveys, while the remaining half of the
surveys had the cooperative questions first. Preliminary Statistical analysis revealed no association between order of items and responses.

## Procedure.

Participants completed the GIQ, CFQ, and DRQ, during class. Participants were instructed to read the document carefully. They were requested to refrain from discussing responses with other students during the session. Participants were debriefed about the purpose of the study after everyone had completed the survey. Time spent completing the survey ranged from 10 to 20 minutes.

Words interpreted as aggressive or non-aggressive in the DRQ were recorded by the author, and a second person, who was blind to the study's aims, examined the list. There was perfect agreement between both persons on the interpretation of aggressive and nonaggressive words. ${ }^{1}$ Words identified as aggressive included: Fight, attack, battling, forceful, anger, aggressive, revved, pumped, mad, fierce, destructive, harmful, rough, dangerous, enemy, and unsafe. Non-aggressive words included: Fun, happy, pleasant, exciting, safe, unity, friendly, bonding, collective, compromise, obedience, helping, sharing, consideration, and understanding.

### 5.2.3 Results

## Sample Characteristics.

A median split was performed to divide the sample into low- and high-frequency videogame players. The median split was conducted separately for each gender because males reported playing videogames each week for a mean ( $S D$ ) of 95 minutes ( 91 ), while the females reported playing 125 minutes (116). If a median split had been performed over the

[^21]whole sample there would have been an imbalance in these data, with a higher proportion of females being classified as low-frequency players, and a higher proportion of males being classified as high-frequency players. Females were divided into low- and high-frequency players by 68 minutes; males were divided by 95 minutes. Following the median split, there were 20 low- and 20 high-frequency females, and 30 low- and 31 high-frequency males. The groups were approximately equal with respect to age. The means (SD) were 13.4 (.94), 13.5 (.83), 13.9 (.88), and 13.7 (.71), respectively.

## Competition, Cooperation, and Aggression.

The DRQ data were analysed with a number of one-way (sex / frequency: low-frequency females, high-frequency females, low-frequency males, high-frequency males) repeated measure ANOVAs. The within-subjects factor constituted the rating of a particular word over cooperative and competitive situations. For example, an ANOVA test was performed on the item 'Forceful' with the repeated measure constituting a participant's rating of 'Forceful' across competitive and cooperative situations.

The ANOVA tests revealed no significant differences on mean ratings of any word on the between-subjects factor of sex / playing frequency, nor were there interaction effects with the between-subjects factor and repeated measure. However, Table 5.1 reveals that significant differences were found on the repeated measure (except on 'pleasant'). An examination of the means in Table 5.1 reveal that participants rated competitive situations as significantly more forceful, aggressive, hurfful, destructive, and exciting, than cooperative situations.

TABLE 5.1: Mean (SD) rating on DRQ items (forceful, aggressive, hurtful, destructive, exciting, and pleasant) for both the competitive and cooperative situations, and associated $F$ values (df), for Study 1

|  | Situation |  | Statistic |
| :--- | :---: | :---: | :---: |
| Scale | Competition | Cooperation | $F$ value (df=1, 99) |
| Forceful | $3.7(1.0)$ | $3.0(1.0)$ | $37^{* * *}$ |
| Aggressive | $4.1(0.8)$ | $2.0(1.0)$ | $209^{* * *}$ |
| Hurtful | $3.0(1.1)$ | $1.7(0.9)$ | $91^{* * *}$ |
| Destructive | $3.1(1.1)$ | $2.0(1.0)$ | $66^{* * *}$ |
| Exciting | $4.4(0.8)$ | $2.7(1.1)$ | $156^{* * *}$ |
| Pleasant | $3.6(1.0)$ | $3.5(0.9)$ | $<1$ |

*** $p<.001$

The CFQ data were analysed like the DRQ data. The between-subjects factor was sex / playing frequency and the within-subjects factor constituted the number of aggressive words used to describe competitive and cooperative situations. A significant repeated measures effect was found, $F(1,99)=61.6, p<.001$. Participants wrote a greater number of aggressive words to describe competitive situations ( $M=1.1, S D=1.1$ ) relative to cooperative situations ( $M=0.1, S D=.48$ ). A repeated measures ANOVA was also performed for the nonaggressive words. Once again, there was a significant repeated measures effect, $F(1,99)=$ 82.0, $p<.001$. Participants wrote a greater number of non-aggressive words to describe cooperative situations ( $M=2.0, S D=1.3$ ), relative to competitive situations ( $M=0.6, S D=$ 0.77 ). There were no significant interaction or main effects across the $F$ tests.

### 5.2.4 Discussion

The findings of the current study revealed that adolescent participants perceive competitive situations as aggressive, and cooperative situations as relatively less aggressive. Based on past experience, participants described competitive situations using aggressive words, while they tended to describe cooperative situations using non-aggressive words. In
addition, aggressive ratings of competitive situations were significantly higher than aggressive ratings of cooperative situations (amongst other related attributes e.g., forcefulness). These data provide suggestive evidence for the idea that people have a knowledge structure, schema, or associative network, which semantically connects competitiveness with aggression, and influences one's perceptions of competitive and cooperative situations.

However, there was no suggestion that males (and/or high-frequency players) perceived competitive situations as relatively more aggressive than females (and/or low-frequency players). Given Bushman's research, that males (and high-trait aggressive individuals) have more developed associative networks than females (and low-trait aggressive individuals), there are two plausible explanations for these data.

The first explanation suggests that the competition-aggression schema is structured differently for each gender and playing frequency groups but that the tasks of this study were not specific enough to tap these disparities. For example, on one task, participants were requested to visualise competitive and cooperative situations they had experienced in the past, and list words to describe those scenarios. Differences in these knowledge structures may have been demonstrated across the relevant factors had a more specific task been employed such as listing words to describe, say, a football match by people who play (or have played) football. However, the explanation that the tests were not sensitive enough to detect gender and playing frequency differences is not supported by the findings presented in Study 5 (see Section 6.2) where a specific sample of videogame players (i.e., male Mortal Kombat players) are reported to perceive cooperative situations as more aggressive than the current general sample.

The second explanation is that these data reflect the exact nature of the knowledge structures across the relevant factors, but that males (and high frequency players) are more likely to select and perform aggressive behaviours during a competitive situation relative to females (and low high frequency players). That is, males/females and playing frequency
groups equally perceive competition as aggressive, but possess different propensities for aggression across a range of competitive situations.

It is worth adding that these findings do not directly replicate Anderson and Morrow (1995; Experiment 1) who found that a university sample rated competitive situations as significantly less pleasant than cooperative situations. The current adolescent sample did not rate competitive situations as more or less pleasant than cooperative situations. Plausible explanations for this incongruence are cultural and/or age differences in the samples. The first factor suggests that there are cultural differences between Australia and the US with respect to competition which cause Australians to interpret and perceive competitive situations as equally pleasant as cooperative situations. The age factor suggests that adolescents have a competition-aggression schema that is not entirely equivalent to the adult schema, probably because of experiential differences in competition through the life cycle. Adolescents are more likely to have competed where they were not expected to perform well, relative to adults, or adults may have experienced more negative experiences during competition because of their vaster life experience. Either way, the sample differences may imply subtle differences in the cognitive structure of the competition-aggression schema. Further research (both cultural and longitudinal) is required to assess the empirical weight of these factors. Another explanation for these inconsistent findings is based on a criticism of Anderson and Morrow's study in which they surveyed only 17 university students. It would be safe to conclude that the results reported in the present study are more reliable than those reported by Anderson and Morrow simply because of the sample size differences.

Despite the clarity of these findings, the current study provides tentative evidence that people perceive competitive situations as aggressive (i.e., through the cognitive filter of a competition-aggression schema) since these data may reflect demand characteristics (i.e., participants' responses where based on perceived expectations) or shared linguistic constructs (i.e., language used to explain, but not necessarily equate with, such experiences). An appropriate test of the link entails the demonstration of aggressive behaviour during competition from which theoretical assertions can be made about the underlying cognitive
characteristics of the putative link. An experimental design was thus employed in the next study as a method for testing the validity of the competition-aggression link.

### 5.3 Study 2:

# Kill Ratios During Competitive and Cooperative Situations Using 

## Super Mario Brothers

### 5.3.1 Introduction

The current study was adapted from Anderson and Morrow (1995; Experiment 2) who employed an innovative methodological approach to the issue of competitive aggression. The reader is referred to Section 3.3.1 for a detailed description of this procedure. There are a number of methodological strengths to Anderson and Morrow's methodology. More specifically, there are a number of advantages in using a videogame as the experimental task. These include the standardised presentation of game characters for each participant, the utilisation of a relatively novel task (which minimises the importation of stereotyped behaviours into the experimental situation), and the technological ability to record videogame play (on a video recorder) in order to score aggressive behaviour at a later time. The structure of the experimental situation also entails a number of advantages. For example, Anderson and Morrow divided the experimental area using a partition that prevented participants from interacting during videogame play. Consequently, extraneous factors (e.g., verbal communication) that may confound aggressive videogame play across competitive and cooperative situations are kept to a minimum.

Despite adopting most of the procedures reported by Anderson and Morrow, there were some important differences in the current study. Firstly, participants were adolescents in this study, rather than university students. Secondly, participants were paired into same-sex
dyads, whereas Anderson and Morrow reported same- and mixed-sex dyads. Statistical analyses by Anderson and Morrow revealed no differences between types of dyads with respect to aggressive behaviour and, thus, it was thought premature to examine this factor when attempting to demonstrate the putative link in the first instance. Thirdly, a matching process was utilised where participants were paired on the basis of their past experience with videogames. The underlying rationale for matching participants on game experience was to increase the probability that pairs were of equal ability and thereby maximising the competitive and cooperative nature of each situation. This matching process was driven by past research (e.g., Epstein \& Taylor, 1967; Merrick \& Taylor, 1970) which shows that subjects demonstrate more competitive aggression when their partner is of equal competence i.e., wins and losses are approximately the same. A weakness of Anderson and Morrow's methodology was the apparent absence of this matching process that possibly introduced extraneous factors e.g., the frustration of a cooperative participant playing with a less competent partner. The matching process of the current study suggests a minimisation of such extraneous factors.

The following study examines whether adolescent participants given a competitive instruction will kill a higher proportion of adversaries when playing a novel videogame, relative to participants under a cooperative instruction. Same-sex dyads were instructed to play a videogame (Super Mario Brothers) for 20 minutes. Videogame play was tape recorded and scored for aggressiveness of play. A questionnaire was administered after game play that contained items about participants' perceptions of the videogame. An additional item within the questionnaire asked participants to state the extent to which they competed with their playing partner (a variable not measured by Anderson and Morrow). It is worth mentioning that no procedures were utilised to measure the affective state of participants (e.g., anger, negative affect) as the initial aim of this study was to demonstrate competitive aggression, particularly across gender groups. A subsequent methodology would be designed in order to replicate the behavioural outcome of competition, and to establish whether the empirical effect occurs with an underlying affective state.

It was hypothesised that participants in the competitive group would have a higher 'kill ratio' than those in the cooperative group (see Section 2.4 for a conceptual explanation of the kill ratio). Gender differences were also explored as a potential confounding factor to competition and cooperation. No hypotheses were formulated for the questionnaire variables. These data were considered as qualifying information of the behavioural measure.

### 5.3.2 Methodology

Power Analysis.
A power analysis was conducted on the Anderson and Morrow data in order to determine the minimum sample size required for this study. The effect size was 1.6 (Cohen's $d$ ) given that there were 30 subjects per group. Working on the authority of Lipsey (1990), 10 participants for each group was estimated as the minimum requirement for finding an experimental effect assuming an effect size of 1.6 , an alpha level of .01 , and power at 0.8 . Since there were two between-subjects factors in this study (gender and type of situation), participants were randomly allocated to groups so that there were approximately 10 males and 10 females in each experimental situation.

## Participants.

Participants were 40 high school students. The mean (SD) age of the sample was 13.5 years (.85) with a range of 12 to 15 . The sample was composed of 21 males and 19 females.

## Materials.

A Super-Nintendo games system, attached with two standard controllers, was used for this study. The games system was connected to a video recorder that fed into a 19 -inch television.

The video recorder enabled participant's play to be tape recorded for subsequent scoring of kill ratios.

The experimental room was constructed as specified by Anderson and Morrow (1995). A partition was placed a metre from the television screen to separate dyads. This prevented paired participants from interacting during game play. A heavy canvas screen was placed behind the participants (i.e., perpendicular to the partition) so that they were separated from the author who watched the videogame play on a smaller television behind the experimental area.

The videogame for the current study was Super Mario Brothers, c. 1987 (as used by Anderson and Morrow, 1995). Super Mario Brothers is a platform game in which the player manipulates the protagonist (Mario or Luigi) in order to travel through a number of levels in a number of consecutive worlds. The player moves Mario or Luigi over deadly creatures. During game play, the player uses the protagonist to smash blocks which reveal coins or mushrooms. The videogame is played in a one- or two-player mode. In the one-player mode, one controller is operational since only one game is being played. In the two-player mode, two people play separate games, with separate controllers, and players alternate turns when they die or finish a level. The protagonist has the ability to run, jump, and throw fireballs (at the adversary). Players accrue points by killing adversary and collecting coins.

Two questionnaires were used for the current study, viz, GIQ and Videogames Perception Questionnaire (VPQ). In addition to the GIQ, participants were requested to state the amount of time spent playing Super Mario Brothers in the past. The VPQ was composed of a number of items (see Table 2.3) which were largely derived from Anderson and Ford (1986). (See Appendix B for a copy of the VPQ.) The VPQ evaluates the respondent's perceptions of the experimental videogame. The participant was again requested (as a cross check) to state the amount of time spent playing Super Mario Brothers before the study began since there was usually a large time delay between collecting the GIQ data and conducting experimental sessions. Participants also rated the extent to which they competed with their playing partner
and whether they knew the aims of the study. An analysis of the responses to this latter item revealed that the aims of the study were not detected by any participant.

## Procedure.

The GIQ was administered to approximately 100 high school students across a number of classes. Participants were deemed eligible for the study if they had played the experimental videogame for an hour or less in the past. It is noted that Anderson and Morrow (1995) used university students who had never played Super Mario Brothers before. The advantage of their study was that it was conducted in 1990-1991 when the videogame had only been released for a few years, and the sample was composed of university students who were less likely to have played videogames than adolescents. It was a rare occurrence when the author found a high school student who had never played the videogame before, although a high proportion had spent a small amount of time playing the game.

Each pair was matched on the amount of time they spent playing videogames across all settings. This ensured that participants were competing or cooperating with someone of equal competence. Pairs were then randomly selected and led from class to the experimental room. They were given a 3 -minute introduction to the videogame, including a demonstration. (See Appendix B for the experimental instructions.) Pairs were then randomly assigned to either the competitive or cooperative condition. Those assigned to the competitive group played Super Mario Brothers using the two-player mode and were instructed to play against each other. Pairs were further instructed to travel as far as possible through the levels. Those assigned to the cooperative group played in the one-player mode and were told that they were playing together using a single controller. When the first player died or completed a level, he (she) was instructed to pass the controller to the second player who was allowed to play until he (she) died or completed a level. All participants were requested to refrain from talking during game play. Participants were given 20 minutes to play.

After the instructions were delivered, the system was re-set and participants began a game at the start of the first level in the first world. Participants were asked to complete the VPQ after the playing period. Debriefing occurred during class after the completion of Study 4. Each pair's play was videotaped and scored at a later time.

Since kill ratios may be influenced by videogame experience, the groups were balanced on this factor. For example, when a pair of males, who played videogames approximately two hours a week, were run in the competitive situation, another pair of males, with similar videogame experience, were run in the cooperative situation. This meant that all pairs were not always randomly assigned to a condition, but this non-random assignment occurred so infrequently as not to warrant concern about the possible extraneous effects on the collected data.

## Scoring Kill Ratios.

The kill ratio formula as defined by Anderson and Morrow (1995) was utilised for this study (see Section 2.4 for a conceptual description). There are several killing responses in Super Mario Brothers. They include: Jumping on top of an adversary; hitting an adversary with a block or turtle shell; and fireballing. There are several avoidance responses in Super Mario Brothers. These include: Jumping over an adversary; running over the top of an adversary on overhanging blocks; and running underneath an adversary. The kill ratio, as defined by Anderson and Morrow, is:
\# killing responses / \# total responses (ie., killing and avoidance responses).

The coding procedure reported by Anderson and Morrow was utilised for this study to estimate kill ratios. That is, a kill ratio was calculated by scoring the participant's last run through the first level of Super Mario Brothers. The author coded the videotapes and another
person, who was blind to the study's aim, calculated twenty participant's kill ratio for the purpose of a reliability analysis.

## Data Analysis.

The data analysis for this study was conducted on both gender and type of situation with means (SD) reported separately for males and females across competitive and cooperative groups. A series of 2 (Situation: competitive, cooperative) X 2 (Gender: male, female) between-subjects ANOVAs were conducted on the reported data. There was no attempt to analyse these data like Study 1 with respect to gender/playing frequency groups (e.g., female low-frequency players) for a number of reasons. Firstly, gender and playing frequency covary (i.e., males spend more time playing videogames) which suggests a statistical redundancy in analysing both variables. Secondly, there is little evidence to suggest that playing frequency alone influences kill ratios, but there is evidence that gender covaries with competitive aggression (e.g., Taylor \& Epstein, 1967). Thirdly, time constraints did not permit collecting the necessary sample size ( $\mathrm{n}=80$ ) to analyse playing frequency as an additional factor in an experimental design. Finally, the data analysis was consistent with that reported by Anderson and Morrow (1995).

### 5.3.3 Results

## Sample Characteristics.

The groups were equal with respect to age. The mean (SD) age for the competitive group was 13.5 years (.61) with a range of 13 to 15 , while the mean $(S D)$ age for the cooperative group was 13.5 years (.79) with a range of 12 to 15 . In addition, the groups were approximately equal with respect to proportion of males and females. The competitive group contained 11 males and 9 females, while the cooperative group contained 10 males and 10 females.

## Videogame Experience.

Table 5.2 shows the videogame experience of males and females in both the cooperative and competitive groups. An immediate observation of these data is that males reported playing videogames for a greater length of time across all settings relative to females, particularly on the personal computer and games system. Males reported spending five times more time playing videogames per week than females. These absolute differences in reported game play were statistically significant (or approaching significance) for each setting.

Furthermore, the cooperative group reported playing for a greater number of minutes across three of the four settings in comparison to the competitive group, and total experience per week for the cooperative group was more than 200 minutes higher relative to the competitive group. Despite these absolute differences, $F$-test comparisons revealed that the groups differed significantly on the arcade parlour factor only i.e., the cooperative group reported playing for a greater number of minutes in the arcade parlour than the competitive group. A contributing factor to these non-significant findings may be the large standard deviations across the items for both sub-samples. Square root and reciprocal transformations of these data failed to alter the $F$-test results.

TABLE 5.2: Mean (SD) videogame play per week (minutes) across several settings (personal computer and games system at home, arcade parlour, and friend's house) for males and females in both the competitive and cooperative groups, and F-values (df), for Study 2.

|  | Males |  | Females |  | F-values (df) |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
|  | Competitive <br> Group <br> $(\mathrm{n}=11)$ | Cooperative <br> Group <br> $(\mathrm{n}=10)$ | Competitive <br> Group <br> $(\mathrm{n}=9)$ | Cooperative <br> Group <br> $(\mathrm{n}=10)$ | Gender <br> $(1,36)$ | Group <br> $(1,36)$ | Gender <br> ( |
|  |  |  |  |  |  | $(1,36)$ |  |
| Personal Comp. | $200(169)$ | $351(332)$ | $38(46)$ | $36(35)$ | $15^{* * *}$ | 1.5 | 1.6 |
| Games System | $161(270)$ | $225(257)$ | $80(113)$ | $59(129)$ | $3.5+$ | $<1$ | $<1$ |
| Arcade Parlour | $2.0(6.0)$ | $37(54)$ | $0.0(0.0)$ | $5.0(10)$ | $3.6+$ | $4.9^{*}$ | 2.7 |
| Friend's House | $45(37)$ | $43(76)$ | $3.0(10)$ | $2.0(6.0)$ | $9.0^{* *}$ | $<1$ | $<1$ |
| Total | $408(391)$ | $656(294)$ | $121(143)$ | $102(125)$ | $24^{* * *}$ | 1.8 | 2.4 |

$$
{ }^{*} p<.05 \quad * * p<.01 \quad * * * p<.001 \quad+p=.07
$$

Finally, there were no significant interaction effects between the experimental and gender groups across all four settings and with total game experience per week.

All groups were approximately equal with respect to their experience with the experimental videogame, viz, Super Mario Brothers. Males and females in the cooperative group indicated a mean (SD) experience of 54 minutes (13) and 33 minutes ( 30 ), respectively, whilst males and females in the competitive group indicated a mean (SD) experience of 49 minutes (87) and 31 minutes (29), respectively. There were no significant main (gender, situation) or interaction effects.

## Kill Ratios.

The mean ( $S D$ ) kill ratios for males and females in the competitive groups were .47 (.14) and $.60(.36)$, respectively. The mean (SD) kill ratios for males and females in the cooperative group were .73 (.21) and .31 (.25), respectively. The relationship between gender and situation type is depicted in Figure 5.1. The figure reveals that males in the cooperative


Figure 5.1 Mean kill ratios (\%) for males and females across the competitive and cooperative groups for Study 2.
situation demonstrated a higher kill ratio than males in the competitive situation, while females in the competitive situation demonstrated a higher kill ratio than females in the cooperative situation. Moreover, competitive males demonstrated a lower kill ratio than competitive females, but cooperative males demonstrated a higher kill ratio than cooperative females. There was a significant interaction between gender and experimental situation, $F$ (1, $36)=12.5, p<.01$.

There was also a significant gender difference on the kill ratios. The mean (SD) kill ratio for females was .45 (.33), whilst for males the mean ( $S D$ ) kill ratio was .59 (.22). That is, males demonstrated a higher kill ratio than females regardless of the type of experimental situation. The difference in kill ratios approached significance, $F(1,36)=3.4, p=.07$.

The mean ( $S D$ ) kill ratios for the competitive and cooperative groups were .53 (.27) and .52 (.31), respectively. Whilst the kill ratios were in the predicted direction, the difference was not significant, $F(1,36)=<1$. Thus, the experimental hypothesis was not supported by these data. Competitive participants did not kill a higher proportion of adversaries relative to the cooperative participants. However, these findings are tempered by the interaction effect between gender and experimental situation.

## Reliability Analysis.

An inter-rater reliability analysis was conducted on the kill ratios. A second rater scored 20 participant's kill ratio. ${ }^{2}$ The mean $(S D)$ kill ratio for the first rater was $.52(.28)$ for these 20 participants, while the mean ( $S D$ ) kill ratio for the second rater was .52 (.29). A correlation coefficient was calculated to measure the congruency between the two sets of estimated kill ratios. The correlation coefficient was an almost perfect positive relationship and was statistically significant, $r(18)=.96, p<.001$. These data suggest that the coding system for the kill ratio was highly reliable.

[^22]
## The Efficacy of Treatment.

The effectiveness of the experimental instructions was evaluated by analysing an item from the VPQ about the extent to which the participant competed with their playing partner during the videogame session. Ratings were made on a 7-point scale where higher values represented greater feelings of competitiveness.

Males and females in the competitive situation indicated a mean (SD) competitiveness level of 4.0 (1.6) and 2.8 (.98), respectively, whilst males and females in the cooperative situation indicated a mean $(S D)$ competitiveness level of 4.2 (2.0) and 2.4 (1.4). There was a significant main effect for gender, $F(1,36)=9.3, p<.01$, but there was no significant main effect on the situation factor, $F(1,36)=<1$, or a significant interaction between gender and situation type, $F(1,36)=<1$. Thus, it cannot be reliably assumed that the treatment effect actually worked: Competitive participants did not report competing more against their playing partner than those pairs within the cooperative situation.

TABLE 5.3: Mean (SD) for males and females in the competitive and cooperative groups on items from the VPQ for Study 2.

|  | Males <br> Competitive <br> Group <br> $(n=11)$ |  | Cooperative <br> Group <br> $(\mathrm{n}=10)$ | Competitive <br> Group <br> $(\mathrm{n}=9)$ |
| :--- | :---: | :---: | :---: | :---: |
| Cooperative <br> Group <br> $(\mathrm{n}=10)$ |  |  |  |  |
| Question | $4.7(2.0)$ | $4.0(1.4)$ | $4.2(2.0)$ | $4.6(1.6)$ |
| How much did you enjoy playing the |  |  |  |  |
| game? | $4.5(1.5)$ | $5.0(1.3)$ | $3.7(1.2)$ | $3.4(1.4)$ |
| How well did you think you played? | $1.8(.87)$ | $2.1(.88)$ | $2.8(1.5)$ | $2.5(1.7)$ |
| How easy was the game to play? | $2.3(1.6)$ | $1.7(1.3)$ | $2.7(1.3)$ | $3.2(1.9)$ |
| How frustrating was the game to play? | $1.1(.30)$ | $1.2(.42)$ | $1.0(.00)$ | $1.3(.50)$ |
| How violent was the game? | $1.8(1.4)$ | $1.4(.70)$ | $1.8(1.1)$ | $2.9(1.9)$ |
| How realistic were the graphics? | $3.9(1.6)$ | $3.8(1.1)$ | $3.2(1.3)$ | $4.6(1.6)$ |
| How interesting was the game to play? |  |  |  |  |

NOTE: Each question was rated on a 7-point scale where ' 1 ' was always the lowest amount of the attribute in question. For example, a rating of ' 1 ' for the question 'how much did you enjoy playing the game' was 'did not enjoy at all', while a rating of ' 7 ' was 'enjoyed it a lot'. The only exception was the question 'how easy was the game to play' where a rating of ' 1 ' was 'very easy' and a rating of ' 7 ' was 'very hard'.

## Videogame Perceptions.

Table 5.3 displays the means (SD) for males and females across the competitive and cooperative groups on items from the VPQ. Generally speaking, male and female participants tended to enjoy playing Super Mario Brothers, and thought they played the videogame well, given that the means were around or above the mid-point of the scale across the groups. Participants thought the videogame was easy and non-frustrating to play, and perceived the game as non-violent and unrealistic, given that the means were below the mid-point of the scale across the groups. A series of 2 (Situation: competitive, cooperative) X 2 (Gender: male, female) between-subjects ANOVAs on the VPQ items revealed no main effects for the situation factor, nor were there any interaction effects between the situation factor and gender. However, there were two main effects with respect to gender, viz, males rated their performance on Super Mario Brothers higher than females, $F(1,36)=8.0, p<.01$, whilst females rated their frustration levels higher than males, $F(1,36)=3.7, p=.06$.

### 5.3.4 Discussion

The current study failed to demonstrate an effect consistent with Anderson and Morrow (1995; Experiment 2). Adolescents placed in a competitive situation did not kill a higher proportion of videogame characters compared with participants given a cooperative instruction. However, there was a significant interaction between gender and type of situation. Cooperative males tended to kill a higher proportion of videogame characters than cooperative females, whilst competitive males tended to kill a lower proportion of videogame characters than competitive females. There was also a significant gender difference in kill ratios with males demonstrating a greater tendency to kill videogame characters than females. Whilst the gender difference is an expected finding, the interaction effect between gender and situation type is counter-intuitive in that competitive males were less aggressive than cooperative males. If these findings were taken as given, they would suggest that the competition-aggression link applies to females, but does not apply to males. This clearly
contradicts past research on the competition-aggression link (e.g., Sherif, 1967, 1972), although the current study was conducted on Australian adolescents which may imply that the counter-intuitive effect is specific to this age group in the Australian context.

An alternative interpretation of these data is the suggestion that the experimental groups had different propensities to aggress before the study began proper. This interpretation is particularly compelling given that the male cooperative group reported playing videogames for a longer period each week in comparison to the other three groups. If we assume that longer videogame play is positively correlated with a higher kill ratio, then it is possible that the male cooperative group had a higher propensity to kill than the male competitive group. If the experimental instructions did not influence male kill ratios (which is probable given their high exposure to videogame play each week), then the difference between the two male groups was a pre-existing behavioural propensity. Thus, this interpretation implies that male videogame play was uninfluenced by the nature of the situation, whilst the competitive situation raised female kill ratios towards that of males.

A final possible explanation highlights an interaction effect between the sample and the videogame. Super Mario Brothers is a relatively old videogame that probably engenders no intrinsic interest for a sample of adolescents (especially those living nearly 10 years after the game's release). The videogame industry has evolved dramatically over the last decade. For university students in the early 1990s, the experimental videogame was probably intrinsically interesting, but it is unlikely that the adolescent sample felt the same way. This explanation is particularly valid when we observe that most adolescents rated Super Mario Brothers as moderately interesting to play. Moreover, there was evidence to suggest that the experimental instructions did not have the desired effect across the groups. Male and female competitive participants did not report competing more than cooperative participants when ratings were examined on a relevant VPQ item. It is argued that the competitive and cooperative participants found the videogame as uninteresting and thus failed to treat the experimental instructions with an adequate level of conviction. This interpretation implies that the interaction effect was a chance occurrence.

### 5.4 Study 3:

## Donkey Kong Country as a Salient Videogame for Adolescents

### 5.4.1 Introduction

This study was conducted using a popular videogame called Donkey Kong Country, c.1994, which was released by Super Nintendo approximately six months prior to the study. The videogame was well known by the adolescent population, and was considered to be a popular title, but not everybody had played the game or had seen it. The methodological procedures were identical to the last study except for the experimental videogame. This study examined whether participants given a competitive instruction would kill a higher proportion of game characters, when playing a relatively novel videogame, compared with participants given a cooperative instruction. Once again, gender was incorporated into the experimental design as a potential covariate with the situation factor. Same-sex dyads were instructed to play the videogame for 20 minutes. Videogame play was tape recorded and scored for aggressiveness of play. The VPQ was administered after the playing period.

As with Anderson and Morrow's original study, it was hypothesised that male and female participants in the competitive group would have a higher kill ratio relative to those in the cooperative group. No predictions were made in relation to the interaction between gender and situation type.

### 5.4.2 Methodology

## Participants.

Participants for this study were 48 high school students. Participants had little or no experience with the experimental videogame. Two participants were excluded from data analysis because they were later found to be close friends (a factor that may have
contaminated these data). Data from a further three participants were excluded because they produced an insufficient number of responses during game play i.e., $<5$. Thus, 41 participants produced reliable responses during the study. The mean (SD) age of the 41 participants was 13.2 years (.76) with a range of 12 to 14 . There were 21 females and 20 males.

## Materials.

The materials utilised were identical to Study 2 except for the experimental videogame. The videogame of this study was Donkey Kong Country (DKC), c.1994. The object of this videogame is to progress through a number of levels in each 'world' by manipulating two simian protagonists, viz, Diddy Kong and Donkey Kong. The player controls only one simian at a time. When the red button is pressed on the Super Nintendo controller, the apes swap position on the screen so that the passive ape becomes active. The two simians have relative strengths and weaknesses. Donkey Kong is relatively slow but very strong, while Diddy Kong is relatively fast but also weak in body strength. Players try to pass through levels without dying and also collect bananas in order to accrue extra lives. A useful feature of DKC, which made the videogame most appropriate for the current study, is that two people can play either together (called the 'team mode') or against each other (called the 'contest mode'). In the 'contest mode', two people play separate games. When one person's game character dies or finishes a level, it is automatically the other person's turn. In the 'team mode', one person (usually Player 1) controls Donkey Kong with the first controller, while the other person (usually Player 2) controls Diddy Kong with the second controller, within the single game. When one person's character dies or completes a level, it is automatically the other person's turm. A player can choose to swap a turn to the other player by pressing the 'select' button on the Super Nintendo controller.

## Procedure.

The procedure of the current study was identical to Study 2. The GIQ was administered to approximately 100 students across a number of classes. Participants were deemed eligible for the study if they had played the experimental videogame for an hour or less in the past. Each pair was matched on the amount of time spent playing videogames across all settings. Pairs were randomly selected and led from class to the experimental room. They were given a 3minute introduction to the videogame, including a demonstration. Since DKC entailed more complicated playing moves than Super Mario Brothers, participants were allowed to practice the videogame in the 'contest mode' for a period of 5 minutes in order to familiarise themselves with the controller. To reduce transfer effects into the experimental period, participants practiced in the first level of the third world. To help participants further familiarise themselves with the control buttons, a controller was photocopied to A4 size and the buttons were labelled. The picture was labelled so that all buttons had their function written on it. For example, the yellow button was coloured yellow and a label was placed upon it to say that the button controlled the jumping movement. The A4 sheet was placed under the television for both players to view it.

After the practice period had ended, pairs were randomly assigned to either the competitive or cooperative groups. Those assigned to the competitive group played DKC in the 'contest mode'. Pairs were told to travel as far as possible through the levels. Those assigned to the cooperative group played in the 'team mode' and were told that they were playing together i.e., the same game. When the first player died or completed a level, the videogame automatically transferred control to the second player until he (she) died or completed a level. All pairs were requested to refrain from talking during game play.

After the instructions had been delivered, the system was reset and participants began playing from the first level in the first world. Each pair played for a 20 -minute period. All pairs were requested to complete the VPQ after the playing period. Participants were debriefed during class after the completion of Study 4. Each pair's game play was videotaped
and scored at a later time. Like Study 2, the groups were balanced in their proportion of males and females, and high- and low-frequency players.

## Scoring Kill Ratios.

The kill ratio formula of Anderson and Morrow (1995) was utilised in the current study. There are several killing responses in DKC which include jumping on top of, tumbling through, or throwing a barrel at, an adversary. There are also several avoidance responses in DKC. These include jumping over, running over the top of, or running underneath, an adversary. The kill ratio was defined as the number of killing responses divided by the total number of responses. For the purposes of a reliability analysis, the current author coded the videotapes and another person, who was blind to the study's aims, calculated 20 participants' kill ratio.

## Data Analysis.

The data analysis for this study was conducted on both gender and type of situation with means (SD) reported separately for males and females across the competitive and cooperative groups. A series of 2 (Situation: competitive, cooperative) X 2 (Gender: male, female) between-subjects ANOVAs were conducted on the reported data. The analyses were identical to Study 2.

### 5.4.3 Results

## Sample Characteristics.

The groups were approximately equal with respect to age. The mean (SD) age for the competitive group was 13.3 years (.73) with a range of 12 to 14 , while the mean $(S D)$ age for the cooperative group was 13.1 years (.79) with a range of 12 to 14 . The groups were
approximately equal in their proportion of males and females. The competitive group had 10 males and 11 females, while the cooperative group had 10 males and 10 females.

## Videogame Experience.

Table 5.4 shows the videogame experience of males and females across the cooperative and competitive groups. Like the last study, males reported playing videogames for a greater length of time each week across all settings relative to females. Males reported playing two times more than females with respect to total videogame play per week. These absolute differences were significant across all settings except on the videogames system factor.

Furthermore, the competitive group reported playing for a greater number of minutes on the personal computer and on a games system relative to the cooperative group. In addition, the competitive group indicated that they played all types of videogames each week for nearly twice as long as the cooperative group. Despite these absolute differences, the $F$-test results showed that the groups did not differ significantly on any variable. A contributing factor to these non-significant findings may be the large standard deviations across the items for both sub-samples. Square root and reciprocal transformations of these data failed, once again, to alter the $F$-test results.

TABLE 5.4: Mean (SD) videogame play per week (minutes) across several settings (personal computer and games system at home, arcade parlour, and friend's house) for males and females in both the competitive and cooperative groups, and F-values (df), for Study 3.

|  | Males |  | Females |  | F-values (df) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Competitive Group ( $\mathrm{n}=10$ ) | Cooperative Group ( $\mathrm{n}=10$ ) | Competitive Group ( $\mathrm{n}=11$ ) | Cooperative Group ( $\mathrm{n}=10$ ) | Gender $(1,37)$ | Group $(1,37)$ | Gender X Group $(1,37)$ |
| Personal Comp. | 209 (155) | 501 (721) | 61 (113) | 141 (223) | 4.2* | 2.3 | <1 |
| Games System | 122 (155) | 230 (286) | 146 (255) | 117 (259) | <1 | <1 | <1 |
| Arcade Parlour | 8.0 (14) | 5.0 (5.6) | 2.0 (1.0) | 0.0 (0.0) | 6.5* | <1 | <1 |
| Friend's House | 28 (20) | 31 (30) | 1.0 (2.0) | 7.0 (10) | 8.0** | <1 | <1 |
| Total | 367 (251) | 767 (719) | 219 (294) | 265 (369) | 5.2* | 2.5 | 1.5 |

Finally, there was no significant interaction effects between the groups (competitive, cooperative) and gender factor across all four settings.

The groups were approximately equal with respect to their experience with DKC. Males in the cooperative group indicated a mean (SD) experience of 6 minutes (13), whilst all cooperative females had never played DKC before the experimental session. Females in the competitive group indicated a mean ( $S D$ ) experience of 1 minute (.9), whilst all competitive males had never played DKC before the study session. There were no significant main or interaction effects.

## Kill Ratios.

The mean ( $S D$ ) kill ratios for males and females in the competitive groups were .71 (.18) and .64 (.15), respectively. The mean ( $S D$ ) kill ratios for males and females in the cooperative group were .74 (.21) and $.61(.19)$, respectively. That is, the kill ratio for males was higher in the cooperative group than in the competitive group, but the kill ratio for females was lower in the cooperative group than in the competitive group. However, these differences were marginal. The interaction between gender and experimental situation was not significant, $F(1,37)=<1$.

An examination of gender revealed that males had a mean $(S D)$ kill ratio of .72 (.19), whilst females had a mean (SD) kill ratio of 62 (.17). That is, males tended to kill a higher proportion of videogame characters than females. However, the gender difference in mean kill ratio was not significant, $F(1,37)=2.6$, n.s.

An examination of the experimental situation factor revealed that the mean kill ratio for the competitive group was 67 (.17), whilst the mean (SD) kill ratio for the cooperative group was 67 (.20). The lack of absolute differences between the kill ratios led to a predictable nonsignificant result, $F(1,37)=<1$. The experimental hypothesis was not supported by these data. Participants in the competitive group did not kill a higher proportion of encountered adversary than the cooperative group.

## Reliability Analysis.

An inter-rater reliability analysis was conducted on the kill ratios. A second rater scored 20 participants' kill ratio (10 from each group). The mean ( $S D$ ) kill ratio for the first rater was .72 (.16) for these 20 participants, while the mean $(S D)$ kill ratio for the second rater was .73 (.15). A correlation coefficient was calculated to measure the degree of congruency between the estimated kill ratios of the raters. The correlation coefficient was an almost perfect positive relationship and was significant, $r(18)=.98, p<.001$. These data suggest that the coding system for the kill ratio was highly reliable to the extent that independent raters were able to derive almost identical results for the same sample.

## The Efficacy of Treatment.

The effectiveness of the experimental instructions was evaluated by analysing a VPQ item about the extent to which the participant competed with their playing partner during the videogame session. Ratings were made on a 7-point scale where higher values represented greater feelings of competitiveness.

Males and females in the competitive situation indicated a mean (SD) competitiveness level of 4.2 (1.8) and 4.5 (1.4), respectively, whilst males and females in the cooperative situation indicated a mean (SD) competitiveness level of $2.2(1.1)$ and $1.9(1.0)$. There was no significant main effect for gender, $F(1,37)=<1$, or a significant interaction between gender and situation type, $F(1,37)=<1$. However, there was a significant main effect on the situations factor, $F(1,37)=29.4, p<.001$. Competitive participants $(M=4.3, S D=1.5)$ rated their competitiveness level higher than cooperative participants ( $M=2.1, S D=1.1$ ). Thus, it was assumed that the experimental instructions produced the desired effect in that the competitive group reported competing more against their playing partner than the cooperative group, regardless of gender.

## Videogame Perceptions.

Table 5.5 displays the means (SD) for males and females across the competitive and cooperative groups on items from the VPQ. Generally speaking, male and female participants enjoyed playing DKC and found the videogame very interesting, given that the means were above the mid-point of the scale across the groups. Participants indicated that the videogame was moderately frustrating to play, thought they played moderately well, and found the graphics moderately realistic, given that the means were around the mid-point of the scale across the groups. Male and female participants rated the videogame as nonviolent.

TABLE 5.5: Mean (SD) for males and females in the competitive and cooperative groups on VPQ items for Study 3.

|  | Males <br> Competitive <br> Group <br> $(n=10)$ |  | Cooperative <br> Group <br> $(n=10)$ | Competitive <br> Group <br> $(n=11)$ |
| :--- | :---: | :---: | :---: | :---: |
| Cooperative <br> Group <br> $(n=10)$ |  |  |  |  |
| Question | $5.9(1.1)$ | $6.4(.84)$ | $5.0(1.3)$ | $5.7(.95)$ |
| How much did you enjoy playing the |  |  |  |  |
| game? | $4.8(.79)$ | $4.3(.95)$ | $3.2(.98)$ | $4.0(.82)$ |
| How well did you think you played? | $3.2(.92)$ | $3.6(.84)$ | $3.7(1.3)$ | $4.1(1.0)$ |
| How easy was the game to play? | $2.8(1.4)$ | $3.3(1.8)$ | $2.7(1.4)$ | $3.3(1.2)$ |
| How frustrating was the game to play? | $1.7(1.1)$ | $1.1(.32)$ | $2.0(1.0)$ | $2.0(1.2)$ |
| How violent was the game? | $2.5(1.4)$ | $4.0(1.6)$ | $2.5(1.4)$ | $2.5(1.7)$ |
| How realistic were the graphics? | $5.9(1.4)$ | $5.8(1.1)$ | $5.1(1.2)$ | $5.5(1.2)$ |
| How interesting was the game to play? |  |  |  |  |

NOTE: Each question was rated on a 7-point scale where ' 1 ' was always the lowest amount of the attribute in question. For example, a rating of ' 1 ' for the question 'how much did you enjoy playing the game' was 'did not enjoy at all', while a rating of ' 7 ' was 'enjoyed it a lot'. The only exception was the question 'how easy was the game to play' where a rating of ' 1 ' was 'very easy' and a rating of ' 7 ' was 'very hard'.

A series of 2 (Situation: competitive, cooperative) X 2 (Gender: male, female) betweensubjects ANOVAs were conducted on the VPQ items. There were no main effects on the situation factor, however, there were three gender main effects. Males ( $M=6.2$ ) enjoyed playing DKC more than females $(M=5.3), F(1,37)=5.9, p<.05$. Females $(M=2.0)$ indicated that DKC was more violent relative to males $(M=1.4), F(1,37)=4.1, p<.05$. Finally, males $(M=4.6)$ rated their performance higher than female participants $(M=3.6), F$ $(1,37)=11.9, p<.01$. However, there was also an interaction effect on this latter item, $F(1$, $37)=5.6, p<.05$. Table 5.5 shows that males and females in the cooperative group indicated a moderate performance on DKC, whilst competitive females indicated a less than moderate performance, and competitive males indicated a higher rating on performance relative to the other groups.

### 5.4.4 Discussion

Once again, the findings from this study failed to provide evidence of the competitionaggression link since adolescent participants who played a videogame in a competitive situation did not kill a higher proportion of videogame characters than peers in a cooperative situation. This behavioural outcome between the groups occurred in spite of the competitive group reporting a greater level of competitiveness than the cooperative group. It is particularly important to highlight the failure to replicate the counter-intuitive interaction effect reported in Study 2, and the failure to replicate the gender difference in which males had a higher mean kill ratio than females. These data were produced without the extraneous influence of an intrinsically uninteresting videogame for the sample because most participants rated DKC as an interesting videogame and enjoyed playing it during the experimental period (regardless of the group). A comparison of ratings from Study 2 and Study 3 reveal that DKC was rated approximately two points higher on level of interest and enjoyment than Super Mario Brothers for both groups (compare Tables 5.3 and 5.5). Consequently, the criticisms
raised of the methodology for Study 2, which were offered as plausible explanations for these findings, cannot be applied to this study.

However, despite our best intentions, there was still a large absolute playing experience difference between the competitive and cooperative groups (although the difference was not significant). The cooperative group reported playing videogames across all settings almost twice as much as the competitive group. If the hypothesis stated in Study 2 (i.e., that higher playing experience increases an individual's propensity to kill during videogame play) is applicable to these data, there is the suggestion that the experimental instructions had the desired effect across groups, but was washed out by the differential levels of game experience. Put another way, the cooperative group's higher propensity to kill videogame characters was counterbalanced by the competitive group's increased tendency to kill adversary caused by the experimental situation. This interpretation suggests that the competitive participants would have demonstrated a higher kill ratio than the cooperative participants had the two groups been equal on videogame experience.

In order to account for pre-existing differences between the competitive and cooperative groups, which may confound with the dependent measure, a repeated measures design was adopted in the next study in order to observe changes in videogame play from a baseline period across the groups. A repeated measures design is advantageous in that more reliable statements are made about whether a competitive instruction increases kill ratios, a cooperative instruction decreases kill ratios, or both.

### 5.5 Study 4:

## A Repeated Measures Design

### 5.5.1 Introduction

The current study was conducted using the sequel to DKC, viz, Diddy's Kong Quest, c.1995, which was released by Super Nintendo approximately a year after the original videogame. Diddy's Kong Quest (DKQ) is similar to the original DKC, although there were enough differences to stimulate interest amongst the adolescent population. DKQ was a potentially popular title that had been played or viewed by few people.

The methodology constituted a repeated measures design in order to examine whether a competitive instruction causes participants to kill more encountered game characters compared to a baseline period, and/or whether a cooperative instruction causes participants to kill less encountered game characters compared with a baseline period. The latter hypothesis, viz , that cooperative participants would kill less encountered characters after a baseline period, was based on research which has shown that cooperative interactions reduce aggressive behaviour (e.g., Sherif \& Sherif, 1969). Once again, same-sex dyads were instructed to play the experimental videogame for 20 minutes. Videogame play was tape recorded and scored for aggressiveness of play. The VPQ was administered after the playing period. No hypotheses were formulated for the questionnaire variables as this information would qualify the findings of the main hypothesis.

### 5.5.2 Methodology

## Participants.

Participants were 40 high school students. Participants had little or no experience with the experimental videogame. The mean age $(S D)$ of the 40 participants was 14.5 years (1.36) with a range of 12 to 17 . There were 16 females and 24 males.

## Materials.

The materials utilised were like Study 3 except for the experimental videogame. The videogame used for this study was Diddy's Kong Quest (DKQ), c.1995. The object of DKQ is similar to DKC in which the player must progress through a number of levels in each world by manipulating two simian protagonists, viz, Diddy and Dixie Kong. Apart from the protagonists, the videogame is comparable to DKC in its programming characteristics.

## Procedure.

The procedure utilised here was similar to the proceeding studies. The GIQ was administered to approximately 100 students across a number of classes. Participants were deemed eligible for the study if they had played the experimental videogame for an hour or less in the past. Each pair was matched on the amount of time they spent playing videogames across all settings. Pairs were then randomly selected and led from class to the experimental room. They were given a 3-minute introduction to the videogame, including a demonstration. Participants were subsequently allowed to practice on the videogame for 5 minutes at a later point in the game (i.e., Level 2; World 1) which acted as the baseline measure. This level was highly similar to the experimental measure (i.e., Level 1; World 1) both in terms of frequency and type of responses. To help participants familiarise themselves with the control buttons, a controller was photocopied to A4 size and the buttons were labelled as in Study 3.

After the baseline period had ended, pairs were randomly assigned to either the competitive or cooperative groups. The instructions delivered to the competitive and cooperative participants were identical to Study 3. Pairs in both groups were asked to refrain from talking during game play. Participants played for 20 minutes. Each pair's game play was videotaped and scored at a later time. Like Study 3, the groups were balanced in proportion of males and females, and high- and low-frequency players.

Once the instructions had been delivered, the system was re-set and participants began the videogame at the start of Level 1, World 1. Participants were requested to complete the VPQ after the playing period. All students were debriefed during class at the completion of the study.

## Scoring Kill Ratios.

The kill ratio formula as defined in the previous studies was employed here (see Section 5.3.2 or Section 5.4.2).

Data Analysis.
The data analysis for this study was conducted on both gender and type of situation with means (SD) reported separately for males and females across the competitive and cooperative groups. A series of 2 (Situation: competitive, cooperative) X 2 (Gender: male, female) between-subjects ANOVAs were conducted on the reported data. The analyses were identical to Studies 2 and 3, except on the kill ratio data in which a $2 \times 2$ repeated measures ANOVA was conducted in order to accommodate the baseline measure.

### 5.5.3 Results

## Sample Characteristics.

The groups were approximately equal in age. The mean age ( $S D$ ) for the competitive group was 14.7 years (1.14) with a range of 13 to 17 , while the mean age (SD) for the cooperative group was 14.4 years (1.57) with a range of 12 to 17 . The groups were equal in proportion of males and females. Both groups contained 12 males and 8 females.

## Videogame Experience.

Table 5.6 shows the videogame experience of males and females across the cooperative and competitive groups. Like the last study, males reported playing videogames for a greater length of time each week across all settings relative to females. Males reported playing four times as much as females with respect to total videogame play per week. These absolute differences were significant on the friend's factor and on total game experience.

TABLE 5.6: Mean (SD) videogame play per week (minutes) across several settings (personal computer and games system at home, arcade parlour, and friend's house) for males and females in both the competitive and cooperative groups, and F-values (df), for Study 4.

|  | Males |  | Females |  | F-values (d) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Competitive Group ( $\mathrm{n}=12$ ) | Cooperative Group $(n=12)$ | Competitive Group ( $\mathrm{n}=8$ ) | Cooperative Group ( $\mathrm{n}=8$ ) | $\begin{gathered} \text { Gender } \\ (1,36) \end{gathered}$ | $\begin{aligned} & \text { Group } \\ & (1,36) \end{aligned}$ | Gender X Group $(1,36)$ |
| Personal Comp. | 254 (399) | 150 (356) | 34 (50) | 59 (107) | 2.2 | <1 | <1 |
| Games System | 105 (135) | 259 (434) | 30 (54) | 44 (105) | 2.7 | <1 | <1 |
| Arcade Parlour | 28 (27) | 22 (20) | 1.0 (2.0) | 6.0 (13) | 1.8 | 1.6 | <1 |
| Friend's House | 29 (54) | 13 (17) | 12 (22) | 0 (0) | 9.5** | <1 | <1 |
| Total | 417 (452) | 443 (506) | 78 (68) | 109 (219) | 6.3* | $<1$ | $<1$ |

$$
{ }^{*} p<.05 \quad * * p<.01
$$

In contrast to Studies 2 and 3, the competitive and cooperative groups were relatively equal with respect to reported playing time across all settings. For example, the absolute difference in total playing time was only 30 minutes across the groups which is considerably less than reported by those samples of Studies 2 and 3. An examination across the settings shows that the competitive group spent more time playing on a personal computer at home, while the cooperative group spent more time playing on a games system. These minor absolute differences in playing time resulted in non-significant $F$ ratios across all the settings. Additionally, there were no interaction effects between gender and experimental situation. A contributing factor to these non-significant findings may be the large standard deviations across the items for the sub-samples. Square root and reciprocal transformations of these data failed to alter the $F$-test results. The groups reported their experience with DKQ. Males in the cooperative group indicated a mean (SD) experience of 24 minutes (37), whilst females in the cooperative group indicated a mean (SD) experience of 9 minutes (21). Males in the competitive group indicated a mean (SD) experience of 17 minutes (27), whilst females in the competitive group indicated a mean (SD) experience of 1 minute (2). There were no significant main or interaction effects.


FIGURE 5.2: Mean kill ratios during baseline and experimental periods for four sub-groups (competitive males and females, and cooperative males and females) for Study 4.

## Kill Ratios.

Figure 5.2 displays the mean kill ratios for the males and females across the baseline and experimental periods in both the cooperative and competitive groups. It is observed that the kill ratios increased from the baseline measure to the experimental period in three groups, whilst it decreased within the cooperative female group. However, the changes within each sub-group were small. They ranged from $2 \%$ to $5 \%$.

A 2 (Gender: male, female) X 2 (Situation: cooperative, competitive) repeated measures ANOVA was performed on the kill ratios. Six of the seven $F$ values did not reach significance and were all less than one. However, there was a significant gender main effect, $F(1,36)=5.6, p<.05$. The mean (SD) kill ratio for females was $.66(.20)$, whilst for males the mean ( $S D$ ) kill ratio was .78 (.11). That is, males demonstrated a higher kill ratio than females, regardless of the type of experimental situation and time period.

## Reliability Analysis.

An inter-rater reliability analysis was conducted on the kill ratios. A second rater scored 20 participants' kill ratio ( 10 from each group i.e., 5 from the baseline and 5 from the experimental period for each group). The mean ( $S D$ ) kill ratio for the first rater was .78 (.15), while the mean ( $S D$ ) kill ratio for the second rater was .81 (.16). A correlation coefficient was calculated to measure the degree of congruency between the estimated kill ratios of the raters. The correlation coefficient was high and was statistically significant, $r(18)=.85, p<.001$. These data suggest that the coding system for the kill ratio was highly reliable because independent raters calculated similar kill ratios from the same sample.

The Efficacy of Treatment.
The effectiveness of the experimental instructions was evaluated by analysing a VPQ item about the extent to which the participant competed with their playing partner during the videogame session. Ratings were made on a 7-point scale where higher values represented greater feelings of competitiveness.

Males and females in the competitive situation indicated a mean (SD) competitiveness level of 4.0 (.85) and 4.5 (1.1), respectively, whilst males and females in the cooperative situation indicated a mean (SD) competitiveness level of $2.2(.72)$ and $1.9(.83)$, respectively. There was no significant main effect for gender, $F(1,36)=<1$, or a significant interaction between gender and situation type, $F(1,36)=2.0$, n.s. However, there was a significant main effect on the situations factor, $F(1,36)=65, p<.001$. Competitive participants ( $M=4.2, S D$ $=.95$ ) rated their competitiveness level higher than cooperative participants $(M=2.1, S D=$ .76). Thus, it was assumed that the experimental instructions produced the desired effect in that the competitive group reported competing more against their playing partner than the cooperative group, regardless of gender.

TABLE 5.7: Mean (SD) for males and females in the competitive and cooperative groups on VPQ items for Study 4.

| Question | Males |  | Females |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Competitive Group ( $\mathrm{n}=12$ ) | Cooperative Group ( $\mathrm{n}=12$ ) | Competitive Group $(n=8)$ | Cooperative Group $(\mathrm{n}=8)$ |
| How much did you enjoy playing the game? | 5.5 (1.1) | 5.7 (1.2) | 4.5 (1.4) | 5.1 (1.3) |
| How well did you think you played? | 4.3 (.94) | 3.5 (1.1) | 3.7 (.72) | 3.5 (1.5) |
| How easy was the game to play? | 3.3 (1.2) | 3.8 (1.4) | 3.5 (1.3) | 3.3 (.72) |
| How frustrating was the game to play? | 3.4 (1.1) | 3.4 (.94) | 3.3 (1.0) | 3.3 (1.5) |
| How violent was the game? | 2.8 (1.2) | 2.0 (.94) | 2.1 (1.1) | 1.7 (.65) |
| How realistic were the graphics? | 4.5 (1.1) | 5.8 (1.2) | 3.7 (2.0) | 4.9 (1.3) |
| How interesting was the game to play? | 5.7 (.94) | 5.2 (.87) | 5.6 (1.3) | 5.6 (1.1) |

NOTE: Each question was rated on a 7-point scale where ' 1 ' was always the lowest amount of the attribute in question. For example, a rating of ' 1 ' for the question 'how much did you enjoy playing the game' was 'did not enjoy at all', while a rating of ' 7 ' was 'enjoyed it a lot'. The only exception was the question 'how easy was the game to play' where a rating of ' 1 ' was 'very easy' and a rating of ' 7 ' was 'very hard'.

## Videogame Perceptions.

Table 5.7 displays the means (SD) for males and females across the competitive and cooperative groups on items from the VPQ. Overall, male and female participants enjoyed playing DKQ, found the videogame very interesting, and rated the graphics as realistic, given that the means were above the mid-point of the scale across the groups. Participants indicated that the videogame was moderately frustrating to play and thought they played moderately well, given that the means were around the mid-point of the scale across the groups. Male and female participants rated the videogame as nonviolent. A series of 2 (Situation: competitive, cooperative) X 2 (Gender: male, female) between-subjects ANOVAs were conducted on the VPQ items. There were no significant interaction effects. However, males $(M=5.6)$ enjoyed playing DKQ more than females $(M=4.8), F(1,36)=3.7, p=.06$, and females $(M=4.3)$ rated $D K Q$ as less realistic relative to males $(M=5.2), F(1,36)=4.3$,
$p<.05$. In addition, the cooperative group $(\mathrm{M}=5.5)$ indicated that DKQ was more realistic relative to the competitive group ( $\mathrm{M}=4.2$ ), $F(1,36)=8.2, p<.01$.

### 5.5.4 Discussion

This study employed a repeated measures design in order to examine whether a competitive instruction during videogame play increases aggression and/or whether a cooperative instruction decreases aggressive behaviour. There was no evidence to support either hypothesis. Once again, there was a failure to replicate the interaction effect between gender and experimental situation as demonstrated in Study 2. Like Study 3, male and female participants indicated that the videogame was interesting and moderately frustrating to play, and reported higher levels of competitiveness under a competitive instruction. Thus, the failure to demonstrate a difference between kill ratios across the experimental groups cannot be attributed to allocation procedures to conditions, the intrinsic quality of the videogame for an adolescent sample, differential playing experience across groups, or the lack of efficacy of the experimental instructions.

### 5.6 Summary and Discussion

Evidence from Study 1 showed that adolescents perceive or interpret competitive situations as aggressive, and that cooperative situations are perceived as relatively less aggressive, and that these data are probably indicative of underlying schemas. It is a significant point that differences were not found between the males and females, or playing frequency groups. The tendency to think of competitive situations as aggressive, and cooperative situations as less aggressive, were equal across males and females, and low- and high-frequency players. Apart from some minor differences, the findings replicated those reported by Anderson and Morrow (1995; Experiment 1).

Study 2 attempted to replicate the findings reported by Anderson and Morrow (1995; Experiment 2) who showed that university students provided with a competitive instruction killed more encountered characters in a videogame than students provided with a cooperative instruction. Study 2 did not provide evidence to support this supposed effect using an adolescent sample. Adolescents placed in a competitive videogame situation did not kill a higher proportion of game characters than adolescents in a cooperative situation. However, a counter-intuitive interaction effect was observed between gender and the competitive/cooperative groups. Cooperative males displayed a higher kill ratio than cooperative females, but competitive females displayed a higher kill ratio than competitive males. An implication of these data is that the competition-link applies to adolescent females, but not to adolescent males, in the Australian context. Two plausible alternative explanations were provided for this interaction effect. Firstly, the differential videogame playing experience of the competitive and cooperative groups confounded with the experimental instructions resulting in a spurious interaction. Secondly, the experimental videogame (Super Mario Brothers) was not intrinsically interesting to adolescents (because this videogame is relatively old). The latter explanation was argued as a plausible interpretation of these data since participants indicated that the videogame was uninteresting to play and the competitive participants failed to report higher levels of competitiveness during the study relative to cooperative participants.

Study 3 utilised a recently released videogame that was intrinsically interesting to adolescents, viz, Donkey Kong Country. The methodology employed for this study was similar to Study 2. While participants found Donkey Kong Country interesting to play, and competitive participants reported higher levels of competitiveness than cooperative participants, once again, there was a failure to demonstrate a difference in the kill ratios across the groups. Moreover, there was no evidence of an interaction effect between gender and the competitive/cooperative situations as reported in Study 2.

Finally, the remaining study employed a repeated measures design using an intrinsically interesting game i.e., Diddy's Kong Quest. The methodology was like Study 3 except a
baseline measure of each participant's kill ratio was recorded before competitive or cooperative instructions were delivered. The pattern of findings were consistent with the previous study to the extent that competitive participants reported higher levels of competitiveness than cooperative participants, and found the videogame interesting to play. In spite of these data, competitive participants did not show an increase in kill ratios from the baseline period nor did cooperative participants show a decrease in kill ratios from a baseline measure. There was no interaction effect between gender and experimental group. Moreover, the groups were equal with respect to their experience with the experimental videogame and also equal on general videogame habits. It cannot be concluded that these data resulted from pre-existing differences between the groups.

An obvious conclusion from these data is that the competition-aggression link is not applicable to Australian adolescents. However, a re-examination of Figure 1.1 and the findings from the literature review may shed an alternative light on why the current methodologies were unable to produce an effect consistent with the competition-aggression link. It would appear that the methodology reported by Anderson and Morrow, which provides a purely cognitive basis of the competition-aggression link, has low experimental power. In regards to Setting factors, the competitive and cooperative situations were highly contrived and there was no attempt to evaluate whether participants interpreted them as relatively salient situations based on past experience. Sherif and his colleagues have reported the only study on adolescent males who were placed in a tournament for prizes. The activities of the tournament were derived from participants' preferences for a competitive situation, and the prizes (e.g., money, knife) were coveted by the males. With respect to Person factors, past research has shown that individuals with high-aggressive dispositions (and males) exhibit more competitive aggression than individuals with low-aggressive dispositions. The current methodologies failed to screen participants on the basis of personality type. Finally, Media factors show that the videogame task was not validated as a measure of social aggression. The videogame 'aggression' (i.e., whimsical creatures being trounced by Super Mario) does not even have a minimum requirement of face validity.

An important point is that there may be interaction effects between personal factors (e.g., age, personality type) and perceptions of a videogame as aggressive behaviour. For example, participants' ratings of Super Mario Brothers from Study 2 revealed that the videogame was perceived as non-violent by the sample. Whilst Anderson and Morrow did not report such ratings for their sample of university students, adult samples may perceive videogames (e.g., Super Mario Brothers) as being more violent than adolescents because of their lower level of videogame experience. However, this point is based on speculation only and makes assumptions about the relationship between videogame experience and perceptions (e.g., desensitisation to violence with more experience).

At a conceptual level, there are also characteristics to Anderson and Morrow's methodology that reduce the likelihood of demonstrating competitive aggression. Recall that the conceptual discussions of Chapter 2 (see Section 2.2) suggested that competitive aggression is greatest under contrient goals and a meanis-interdependent task (Quadrant 1 ; see Figure 2.1), whilst competitive aggression is smallest under promotive goals and a means independent task (Quadrant 4; see Figure 2.1). However, Anderson and Morrow's methodology establishes competitive (Quadrant 2) and cooperative (Quadrant 3) situations that are least likely to differ with respect to competitive aggression, viz, a competitive situation of task independence, and a cooperative situation of task interdependence. ${ }^{3}$ In sum, the methodology employed by Anderson and Morrow minimises the chances of observing differences in competitive aggression between the competitive and cooperative situations because of the disparate nature of the groups with respect to the means-dependent dimension. Thus, this conceptual issue coupled with the low power of Anderson and Morrow's methodology provides a clear explanation as to why the current studies failed to yield an effect supporting the competition-aggression link.

[^23]Perhaps a saving grace for the Anderson and Morrow approach is based on their thesis that:

Simply defining a situation as competitive (vs. cooperative) is sufficient in many circumstances to produce significant increases in aggressive behavior. The main circumstances in which this is likely to occur is when the situation is ambiguous along two dimensions. First, the situation must be ambiguous with regard to how much aggression is called for. ... Second, the situation must be relatively novel. If one has been in the same situation repeatedly, one is likely to have already formed a standard way of behaving in it; such behavioral scripts are likely to be used regardless of some instruction to view the situation differently. (Anderson \& Morrow, 1995, p. 1022)

Based on this thesis, it could be argued for the current context that the adolescent participants, who were generally highly experienced at playing videogames (as indicated by these sample data), produced stereotyped responses during the experimental sessions regardless of whether they were competing or cooperating, or whether they had played the experimental game before the session had begun. That is, despite the use of a recently released videogame, the task itself was not novel for participants. This argument would imply that the utilisation of a videogame task for an adolescent population imports a number of problems associated with general game experience. Thus, it is concluded that the methodological power of studies utilising a videogame task, on adolescent participants, must be maximised in order to demonstrate competitive aggression. This conclusion suggests that the simple methodological approach of Anderson and Morrow (1995) is probably inappropriate for adolescents.

### 5.7 Conclusions

In conclusion, the studies reported thus far have failed to demonstrate the competitionaggression link when adopting the methodological procedures of Anderson and Morrow. In other words, the findings have not generalised from US university students to Australian adolescents. These findings may imply that the link is culturally bound and/or age specific, but a review of past research, and the nature of participants, suggest that the original study is less appropriate for adolescents who generally have a greater degree of experience with videogames.

## Chapter 6

# Ecological (and Non-Ecological) Competition Leads to Aggressive Videogame Responses by Task Experienced Adolescent Males 

### 6.1 Overview

The current chapter reports a series of studies that utilised self-selected samples of adolescent males who were proficient at Mortal Kombat (i.e., a martial arts simulation videogame). Unlike the previous studies, participants were placed in an ecological competitive situation i.e., a tournament. Study 5 constitutes a preliminary investigation into the cognitive structure of the competition and cooperation schemas amongst Mortal Kombat players. The methodology was almost identical to Study 1. Comparisons were conducted between the Mortal Kombat sample and the general sample from Study 1. Data for this study were collected a week before Study 6 and Study 7 began. Study 6 attempted to demonstrate the competition-aggression link by maximising the power of the experimental design. Participants were placed in an ecological situation (i.e., a tournament); rewards were offered to winners; the sample (which was self-selected) was composed of males only; the videogame
was violent; and a baseline measure, of a less competitive situation, was incorporated into the design. Data for this study were collected during May-April, 1997. A major shortcoming of this study was a confounding factor of an audience during the tournament. Furthermore, a limitation of this study was the inability to pinpoint those factors that contributed to the experimental effect. Two further studies examined two situational factors with respect to the effect, viz, the reward and a tournament situation. Study 7 was a systematic replication of Study 6. The same experimental procedure was utilised except that rewards were not offered to participants for winning. Data for Study 7 were collected during October-November, 1997. Study 8 investigated the argument that the competitive aggression of Study 6 was contaminated by the presence of an audience. Mortal Kombat players competed in a nontournament situation for prizes. There was no audience present during videogame play. Participants' angry feelings, and positive and negative affect, were self-reported at three time points during Study 8, viz, pre-practice period, post-practice period, and post-competition period. Theoretical explanations for the competition-aggression link were explored using these self-reported data. Data for this study were collected during April-May, 1998. Finally, Study 9 was a validation exercise which evaluated the validity of the Mortal Kombat kill ratio as an aggressive behaviour. Data for this study were collected during Study 8.

### 6.2 Study 5 :

## Comparative Analysis of General Adolescent Sample and Mortal Kombat Group on the Competition and Cooperation Schemas

### 6.2.1 Introduction

The primary aim of the current investigation was to assess the suggestion that Mortal Kombat players perceive competitive situations as aggressive and cooperative situations as less aggressive i.e., that there is an underlying competition schema in human memory that contains more aggressive elements than the cooperation schema. An additional purpose of this investigation was to provide a comparative analysis of responses provided by the general sample of Study 1 and those elicited from a sample of proficient Mortal Kombat players in order to evaluate potential disparities across the groups with respect to perceptions of competition and cooperation. The methodology for this study was comparable to Study 1.

A potential criticism of this study is that these data are redundant because Study 1 entailed the collection of data from high-frequency playing males whose responses generalise to the current sample of Mortal Kombat players. However, this criticism is invalid because of the procedures utilised to collect each sample. Recall that the sub-sample of males from Study 1 was randomly selected from across the high school whilst the current group was self-selected. The Mortal Kombat players utilised for this study were highly skilled at a competitive-violent videogame which creates the potential for a greater propensity to associate competition with aggression. This greater propensity to associate competition and aggression is caused either by highly aggressive males, who have a pre-existing salient competition-aggression schema, being attracted to competitive-violent videogames, and/or experience with a competitiveviolent videogame increasing the saliency of the schema.

It was hypothesised that Mortal Kombat participants would interpret competitive situations as aggressive, and cooperative situations as significantly less aggressive. No specific predictions were made in relation to the comparative analyses of the Mortal Kombat participants and the General sample. These analyses constituted exploratory research.

### 6.2.2 Methodology

## Participants.

Participants were 22 high school students who were proficient Mortal Kombat players. All participants were males. Twenty participants were 15 years old, whilst two participants were 16 years old.

## Materials.

The survey used in Study 1 was administered to the Mortal Kombat participants. A copy of this survey is in Appendix A. The survey contains the General Information Questionnaire (GIQ), the Common Features Questionnaire (CFQ), and the Dimensional Ratings Questionnaire (DRQ). Additional items were included in the survey that instructed respondents to indicate the amount of time they had spent playing Mortal Kombat 1, Mortal Kombat 2, and Mortal Kombat 3.

## Procedure.

All 16 participants from Study 6 completed the survey a week before game playing sessions were conducted. Six participants from Study 7, who did not participate in Study 6, also completed the survey. The survey was completed during a lunch period. Participants were requested to refrain from discussing their responses with other respondents during the session. Participants took between 10 and 20 minutes to complete the survey.

The coding schedule utilised in Study 1 for interpreting responses as aggressive or nonaggressive from the DRQ was employed in this study. The author coded each participant's questionnaire, whilst a second person, who was blind to the study's aims, scored the same surveys for the purpose of a reliability analysis. There was perfect agreement between both persons on the coding of the surveys.

### 6.2.3 Results

## Sample Characteristics.

The mean ( $S D$ ) age for the Mortal Kombat sample was 15.1 (.29) years, whilst the mean age for the General sample was 13.6 (.84) years. The difference between the sample means was statistically significant, $t(121)=13.8, p<.001$. That is, the Mortal Kombat participants were significantly older than the General sample.

Table 6.1 displays the general videogame experience of the respective samples across a number of settings. The General sample reported playing videogames on the personal computer for greater than two hours than the Mortal Kombat sample, whilst the Mortal Kombat sample indicated that they played on both a games system and at a friend's house for half an hour longer than the General sample. Despite these large absolute differences, $t$-test comparisons showed that the groups only differed significantly on the personal computer variable. Again, like the previous studies, a factor contributing to these findings may be the large standard deviations across the settings and/or the lack of equality between the groups with respect to the spread of the scores. Square root and reciprocal transformations of these data failed to alter the $t$-test results. The Mann-Whitney $U$ test was subsequently employed to analyse these data because the non-parametric equivalent to the $t$ test makes less stringent assumptions about the spread of the population scores. Table 6.1 shows that the only significant result was, once again, on the personal computer.

TABLE 6.1: Mean (SD) videogame play per week (minutes) across several settings (personal computer and games system at home, arcade parlour, and friend's house) for the General and the Mortal Kombat samples, and zvalues.

|  | General Sample <br> $(\mathbf{n}=\mathbf{1 0 1 )}$ | Mortal Kombat Sample <br> $(\mathbf{n}=\mathbf{2 2})$ | z-value |
| :--- | :---: | :---: | :---: |
| Personal Computer | $245(486)$ | $100(199)$ | $2.1^{*}$ |
| Games System | $174(253)$ | $204(209)$ | -1.3 |
| Friend's House | $60(120)$ | $91(136)$ | -1.5 |
| Arcade Parlour | $89(268)$ | $71(51)$ | .37 |
| Total | $568(791)$ | $466(291)$ | .28 |

* $p<.05$

The Mortal Kombat sample indicated the amount of hours they had spent playing each version of Mortal Kombat. Participants were instructed to provide a response within specified categories (e.g., 1-10 hours), rather than make exact estimations of time spent playing each version. Table 6.2 reveals that whilst nearly half the sample had played Mortal Kombat 1 for 10 hours or less, a large proportion of participants had played Mortal Kombat 2 ( $73 \%$ ) and Mortal Kombat 3 ( $91 \%$ ) for at least 11 hours. Thirty-seven percent of respondents indicated playing Mortal Kombat 2 for greater than 50 hours, and $27 \%$ indicated playing Mortal Kombat 3 for greater than 50 hours. As a whole, these data suggest that the Mortal Kombat sample had spent a considerable amount of time playing these videogames.

TABLE 6.2: Frequency (\%) of time spent playing each version of Mortal Kombat as indicated by the Mortal Kombat sample ( $\mathrm{n}=22$ ).

|  | Mortal Kombat 1 | Mortal Kombat 2 | Mortal Kombat 3 |
| :--- | :---: | :---: | :---: |
| Categories of time <br> spent playing <br> (Hours) | Frequency (\%) | Frequency (\%) | Frequency (\%) |
| Never |  |  |  |
| $1-10$ | $1(4.5)$ | - | - |
| $11-20$ | $9(41)$ | $6(27)$ | $2(9)$ |
| $21-50$ | $6(27)$ | $6(27)$ | $6(27)$ |
| $>50$ | $1(4.5)$ | $2(9)$ | $8(37)$ |
| Total | $5(23)$ | $8(37)$ | $6(27)$ |

## Competition, Cooperation, and Aggression.

Table 6.3 displays the DRQ data for the Mortal Kombat sample. For convenience sake, the DRQ data from Table 5.1 have been integrated into the table in order to compare the responses provided by the Mortal Kombat sample with the General sample. An examination of these data suggests that the mean ratings are strikingly similar across the respective samples on both the competitive and cooperative situations. A series of repeated measures ANOVAs, incorporating a between-subjects factor (Group: Mortal Kombat, General), were conducted in order to examine potential differences on each item (e.g., 'Forceful') across the groups. Analyses from Study 1 revealed that the General sample rated all items as significantly greater for competitive situations relative to cooperative situations, except on the 'Pleasant' item. However, an examination of the within-subjects $F$ tests for this study revealed that all items were rated higher for the competitive situation including the 'Pleasant' item. That is, competitive situations were rated as significantly more pleasant than cooperative situations across the two samples. It is noted that the difference between the ratings was less than half a point.

The $F$ test based on the interaction of the between- and within-subjects factors was of paramount interest to this study so as to assess the potential for differences between the Mortal Kombat and General samples in their perceptions of competitive and cooperative situations. Table 6.3 shows that there was one significant difference, viz, 'Aggressive' item. An examination of the means reveal that the Mortal Kombat sample tended to rate cooperative situations as more aggressive and competitive situations as less aggressive than the General sample. $T$-test comparisons revealed that the Mortal Kombat sample rated cooperative situations as significantly more aggressive than the General sample, $t(121)=2.1$, $p<.05$, but did not rate competitive situations as less aggressive, $t(121)=1.0$. Despite these group differences, the Mortal Kombat sample rated competitive situations approximately 1.4 points higher (on a 5-point scale) on aggression than cooperative situations.

TABLE 6.3: Mean (SD) rating on DRQ items (forceful, aggressive, hurtful, destructive, exciting, and pleasant) for both the competitive and cooperative situations for the General and Mortal Kombat samples, and Within and Between X Within F-values (df).

|  | General Sample <br> $(\mathbf{n}=101)$ |  | Mortal Kombat Sample <br> $(\mathbf{n}=\mathbf{2 2})$ |  | F value (1, 121) |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Scale | Competition | Cooperation | Competition | Cooperation | Within | BXW |
| Forceful | $3.7(1.0)$ | $3.0(1.0)$ | $3.7(0.8)$ | $3.0(1.0)$ | $28^{* * *}$ | $<1$ |
| Aggressive | $4.1(0.8)$ | $2.0(1.0)$ | $3.9(.77)$ | $2.5(1.1)$ | $107^{* * *}$ | $4.5^{*}$ |
| Hurtful | $3.0(1.1)$ | $1.7(0.9)$ | $2.7(1.0)$ | $2.0(1.0)$ | $45^{* * *}$ | 3.2 |
| Destructive | $3.1(1.1)$ | $2.0(1.0)$ | $3.1(1.2)$ | $2.3(1.1)$ | $38^{* * *}$ | $<1$ |
| Exciting | $4.4(0.8)$ | $2.7(1.1)$ | $4.5(0.8)$ | $2.6(1.4)$ | $129 * *$ | $<1$ |
| Pleasant | $3.6(1.0)$ | $3.5(0.9)$ | $3.9(1.1)$ | $3.3(1.0)$ | $4.5^{*}$ | 1.9 |

$$
* p<.05 \quad * * * p<.001
$$

An examination of the CFQ data across the two groups, once again, revealed a consistency of responses. The General sample wrote a greater number of aggressive words to describe competitive situations ( $M=1.1, S D=1.1$ ) relative to cooperative situations ( $M=0.1, S D=$ .48). Likewise, the Mortal Kombat sample wrote a greater number of aggressive words to describe competitive situations ( $M=1.2, S D=1.3$ ) relative to cooperative situations ( $M=0.0$, $S D=0.0$ ). A repeated measures ANOVA, incorporating a between-subjects factor (Group: Mortal Kombat, General), was conducted in order to examine whether the groups differed significantly in their tendency to describe competition and cooperation. The interaction effect was not significant, $F(1,121)=1.3$, n.s. In addition, the General sample wrote a greater number of non-aggressive words to describe cooperative situations ( $M=2.0, S D=1.3$ ), relative to competitive situations ( $M=0.6, S D=0.77$ ). Likewise, the Mortal Kombat sample wrote a greater number of non-aggressive words to describe cooperative situations ( $M=1.8$, $S D=1.1$ ), relative to competitive situations ( $M=0.14, S D=0.47$ ). A repeated measures ANOVA was also conducted on these data. The interaction effect did not reach significance, $F(1,121)=<1$.

### 6.2.4 Discussion

There was a general consistency in the responses provided by the Mortal Kombat sample and those of the General sample of Study 1. Participants across both groups tended to perceive competitive situations as significantly more aggressive, forceful, hurtful, destructive, exciting, and pleasant, than cooperative situations. In addition, both samples wrote an equal number of aggressive words to describe competitive situations, and an equal number of nonaggressive words to describe cooperative situations. These findings were evident despite the fact that the General sample was younger and reported spending a significantly greater amount of time playing videogames on the personal computer.

Despite these consistent responses across the groups, the Mortal Kombat sample rated cooperative situations as being more aggressive than the General sample, but did not rate competitive situations as more or less aggressive in comparison to the same reference group. It is difficult to interpret what these group differences actually imply about the samples. On the one hand, the differences in mean ratings suggest that the Mortal Kombat sample have the propensity to perceive a larger range of cooperative situations as aggressive. On the other hand, they imply that participants from the Mortal Kombat sample have a wider (and an imbalanced) experience with competitive situations (relative to the General sample), and thus find it more difficult to differentiate between competition and cooperation. Despite the relative strength of each interpretation, these data imply that the Mortal Kombat sample will perceive a larger number of situations as aggressive regardless of whether the situation is cooperative, competitive, or ambiguous along these dimensions. However, it is beyond the scope of this study to determine how these differences arose as an appropriate examination of this issue would require an empirical investigation from a developmental, individual differences, and/or cultural perspective.

Future research should examine people's concepts of competition and cooperation as few studies have been devoted to understanding what these concepts mean for different cultures, age and/or gender groups. There are a number of questions that one might pose during such a study. These include: What do people define as a competitive and/or cooperative situation e.g, how rich and diverse is the concept?; Do people believe that competition is related to social status, professional background, finance, schooling, business, and/or friendships?; What sort of people have broad conceptions of competition/cooperation and what sort of people have narrow conceptions of competition/cooperation?; Where and how are these concepts formed?; and, finally, what function do these concepts serve within contexts such as schooling and sport? It is the task of future research to elucidate the relevance of these issues.

### 6.3 Study $6:$

## Mortal Kombat 3 Tournament for Prizes

### 6.3.1 Introduction

A major criticism raised of the studies reported in Chapter 5 is that the methodological procedures were of low power. That is, the methodological procedures produced an experimental situation that minimised the likelihood of demonstrating the competitionaggression link. Consequently, the current study is based on a methodological procedure that maximises the probability of finding an effect. Adolescent males were confronted with a task that was intrinsically motivating (i.e., a videogame they were highly proficient at) under a competitive situation of an ecological nature (i.e., a toumament for prizes). From a theoretical perspective, this study has both 'experimental realism' (i.e., the videogame task was treated seriously by subjects) and 'mundane realism' (i.e., the laboratory situation had similarities with competitive events occurring in the 'real world') (Carlsmith et al., 1976). The methodological approach of maximising experimental power is consistent with theoretical views in social psychology. Rosenblatt and Miller (1972) typified this view when they wrote:

We concur with the principle of manipulating independent variables as strongly as possible. Increasing the involvement of subjects may not only reduce the hazards of experimenter bias and demand characteristics, but, additionally, it may increase the likelihood that the effect sought will appear. Furthermore, it probably reduces the number of subjects needed to reach an adequate level of sensitivity. (p. 54)

However, a potential limitation of this approach is that a number of variables are manipulated strongly to demonstrate the effect, but that the precise effects of each factor is lost. This issue is true of the current study. It is noted that studies subsequent to the current investigation attempt to overcome this limitation by acting as systematic replications i.e., a factor (e.g., the reward) is stripped from the methodology to examine whether the experimental effect still persists.

Adolescent males, who constituted a self-selected sample of high school students, played a videogame they were proficient at under a low competitive situation (i.e., a trial period) and a high competitive situation (i.e., a tournament for prizes). The low competitive situation was treated as a baseline measure of each participant's kill ratio, while the high competitive situation was the repeated measure. The methodological design utilised in this study is a hybrid of Sherif's experiments (i.e., male adolescents in a tournament for prizes) and Anderson and Morrow's videogame procedure.

It was hypothesised that participants would have a higher kill ratio during the high competitive situation when compared with the kill ratio of the low competitive situation.

### 6.3.2 Methodology

## Participants.

Participants were 16 male high school students. Fifteen participants were 15 years old, and one participant was 16 years old. All participants were highly proficient at Mortal Kombat 3 (MK3).

## Recruitment.

Participants were recruited by placing a notice in the school's newsletter that informed students of an information session the following day on a Mortal Kombat tournament. The notice made it clear that only proficient MK3 players (i.e., those who could perform 'special
moves') were eligible for the competition. It was also mentioned that prizes were being offered to the best players of the competition. Since MK3 has an MA classification from the Australian Office of Film and Literature Classification (OFLC), participants who were under 15 years of age were not permitted to compete.

## Mortal Kombat 3.

The videogame utilised for this study was MK3, c. 1995. The OFLC has classified MK3 for Mature Audiences (MA) suggesting that the videogame "contains elements likely to disturb, harm or offend those under 15 years to the extent that it should be restricted to those 15 years and over" (OFLC, 1994, p. 7). ${ }^{1}$ MK3 is the third game in a series of martial arts simulations where two players fight against each other within the videogame. The videogame manual describes the fictitious history of the Mortal Kombat toumament:


#### Abstract

The Shaolin Tournament for Martial Arts, better known as Mortal Kombat was, for countless ages, a noble institution that tested the metal of the very best Warriors. Years ago, the Toumament was corrupted by the evil sorcerer Shang Tsung who dared to take not only the lives of his opponents, but their very souls. Eventually, it became known that Shang Tsung was acting at the behest of his diabolical master Shao Khan, Emperor of the Outworld, who planned to claim all the souls on earth. The Champions of Earth: Liu Kang, Kung Lao, their Ancestors and others have, so far, thwarted this plan. For centuries, Earth has used Mortal Kombat to defend itself against the Outworld's Emperor, Shao Kahn. (Super Nintendo, 1996, p. 5)


The player, in the context of this Tournament, chooses between 15 mortal fighters. Each fighter has generic or basic moves (e.g., punch, low kick, sweep). The Mortal Kombat manual outlines the importance of perfecting these basic moves: "Each kontestant invited to
the Tournament has spent years in practice and meditation to perfect his/her martial arts skills. Before challenging these Warriors in Kombat, you too, should practice the martial arts by meditating on these lessons" (Super Nintendo, 1996, p. 17).

Each fighter has unique playing moves in addition to these basic moves. There are two types of unique playing moves. 'Special moves' are performed by the player during a round and are executed by pressing a complex combination of buttons on the joypad. The Mortal Kombat manual suggests that: "All of the Mortal Kombat Warriors possess expert fighting skills. In that respect, they are equal to thousands of other Warriors around the universe. What raises them above their peers are the special moves which they have created and perfected" (Super Nintendo, 1996, p. 18). These complex combination of button presses for each fighter are obtained from videogame magazines or from the Internet. For example, Cyrax, a fighter in MK3, releases a net that entraps the other game character when the player presses backwards twice on the joypad and then performs a low kick.

In contrast, 'finishing moves' are executed by pressing a combination of buttons on the joypad but only after the round has ended i.e., when one character has no energy or health remaining. At this point, the winning player, who is prompted by the videogame to "Finish Him (Her)", has the choice of performing either a violent or a non-violent finishing move. There are two types of non-violent moves, viz, 'babality', where the losing fighter is converted to a baby, and a 'friendship', where the winning fighter offers a gift to the losing fighter. There are two types of violent moves, viz, 'fatality', where the winning fighter kills the losing fighter, and an 'animality', where the winning fighter transforms into an animal and mauls the losing fighter to death. All 15 fighters have two different types of fatalities. Unlike special moves, that are performed during a round in order to move a player towards victory, finishing moves are inconsequential to the fight's outcome because they are performed by the winning player, at the end of a round, when the other player is defeated.

[^24]Thus, the winning player has the opportunity either 'to kill or not kill' the opponent's fighter at the end of each round. This study focussed on the frequency of killing versus nonkilling finishing moves across two types of competitive situations i.e., low and high competition. The rationale for focussing on finishing moves instead of other playing moves (e.g., special moves) was based on the author's observations that the latter type of responses are highly stereotyped because each player develops a style of play that is formed from hours of practice on the videogame. In contrast, finishing moves are less stereotyped because when they are executed, the fight's outcome is not altered. Since there were three violent moves (i.e., two fatalities and one animality), and only two types of non-violent moves, participants were instructed to refrain from executing an animality during the trial period and tournament.

A useful characteristic of MK3 is a 'cheat' mode called a 'one-button finishing move'. When this cheat is activated, at the start-up menu of the videogame, players can press a single button on the joypad to execute a finishing move. An advantage of initialising this 'cheat' was that players did not have to remember the complex button presses required for each type of finishing move for their fighter. Another positive feature of activating this mode was that a finishing move could be performed at the end of every round which meant that a higher number of finishing moves was generated for any single match.

A joypad was photocopied to A4 size in order to help participants familiarise themselves with the one-button finishing moves. The A4 sheet was placed under the television where participants could easily view it. The joypad was labelled so that each button had a finishing move written upon it. For example, the yellow button was coloured with yellow crayon and labelled "fatality". A cross was placed over the animality button to remind participants that they were not permitted to choose this response.

## Procedure.

This study was conducted over a 3-week period. All sessions were held during lunch hours. During the first week, participants came to an information session where the competition's procedures were described in detail. Participants were given an envelope that
contained a number of relevant items for the competition. Firstly, the envelope contained a letter addressed to the participant's parents that outlined the nature of the study. A consent form was also attached to the letter. Participants were instructed to give the letter to their parents and to return a completed consent form (signed by a parent) if they wished to participate in the study. Secondly, the envelope contained a document from a videogame magazine that showed the participant how to perform the 'special moves' and 'finishing moves' of all 15 fighters.

For the remainder of the first week, informal practice sessions were conducted during recess and lunch with the 16 competitors. These practice sessions allowed competitors to practice the videogame moves and to provide the author with an opportunity to rank competitors in terms of their relative abilities. At the end of the week, all participants were ranked in a rudimentary manner, from best to worst, and a schedule was devised for the trial period conducted in the following week. The top four ranks were placed into four different groups (i.e., Monday Trial Group, Tuesday Trial Group, Wednesday Trial Group, and Thursday Trial Group), the next four ranks were, again, placed into the four separate trial groups, and so on, until all 16 participants had been allocated to a trial group session. The schedule containing the trial groups was placed outside of the building where the toumament was conducted and competitors were requested to attend only the lunch hour to which they had been assigned. By the end of the first week, participants had returned a consent form and had chosen one fighter for the trial period and toumament. Participants were not permitted to change the fighter they had chosen at any point in the study. ${ }^{2}$

The trial groups were run during the week following the information session. When a trial group arrived on their nominated day, competitors were paired and rotated so that they played each other once only. Thus, there were six matches played over the lunch hour. Each match

[^25]between a given pair was conducted as the best of three games (where a game was the best of three rounds). The remaining pair, who were not competing for the purpose of the trial, were allowed to practice MK3 in an adjacent room on another Super Nintendo games system. Participants were told at the start of the lunch period that the trials served to rank competitors for the tournament. The trials were recorded on videotape.

At the completion of the second week, when all had participated in a trial group session, participants were ranked on the basis of their performances. A tournament draw was devised based on these ranks and was posted outside the building where the tournament was conducted. The tournament draw was constructed so that the top-ranked player was assigned to playing the bottom-ranked player during Round 1 , the second-ranked player was assigned to playing the fifteenth-ranked player, the third-ranked player was assigned to playing the fourteenth-ranked player, and so on, until all players were paired with another player. In addition, the draw was designed so that a high ranked player did not meet another high ranked player until late in the toumament. This meant that the top-ranked player did not meet the second-ranked player until the final, assuming that both players progressed that far in the tournament.

The toumament was conducted during three lunch periods in the week following the trials. The tournament was conducted like a tennis event. During Round 1, the first pair were escorted from the classroom into a practice room, which was adjacent to the experimental area, in which they were allowed to practice for approximately 5 minutes on a spare Super Nintendo system. At the end of the practice session, the second pair were escorted into the practice room and the first pair, who had now ended their practice session, were escorted into the experimental area in order to compete proper. ${ }^{3}$ Matches were played as the best of three games (where a game was the best of three rounds). The match was terminated when the first player reached two games. Thus, if a player was leading 2 games to nil, the match was terminated and the losing player was eliminated from the tournament. The winning player

[^26]progressed into the Quarter Final round. The third pair of Round 1 were subsequently escorted from the class room into the practice room, and the second pair were escorted into the experimental area in order to compete proper. This procedure was repeated until all pairs from Round 1 had competed in the experimental area. When Round 1 matches had ended, the same procedure was employed for Quarter Final matches. There were eight matches during Round 1, four matches during the Quarter Finals, two matches during the Semi Finals, and the Final. Round 1 matches were conducted on Monday, Quarter Final and Semi Final matches were conducted on Tuesday, and the Final was conducted on Wednesday. The toumament was recorded on videotape.

To increase the competitive nature of the tournament, matches were transmitted from the experimental area to a closed circuit television in the class room. The tournament attracted nearly 40 spectators for the Final on Wednesday.

Prizes were offered to increase the competitive nature of the tournament. Losing semifinalists were each awarded a $\$ 10$ gift voucher, the losing finalist was awarded a $\$ 25 \mathrm{gift}$ voucher and a trophy, and the winner was awarded a $\$ 40$ voucher and a larger trophy. Competitors were aware that they were playing for prizes at the commencement of the study.

## Kill Ratios.

The kill ratio was defined for this study as the total number of fatalities divided by the total number of finishing moves (i.e., fatality, babality, and friendship) performed by a participant. Videotapes from the trial period and tournament were scored by the author in order to estimate each participant's kill ratios. A second person, who was blind to the study's aims, scored these video tapes for the purpose of a reliability analysis. There was perfect agreement between the author's calculations and those of the second rater.

### 6.3.3 Results

Participants who failed to produce a finishing move in the trial period and/or tournament were excluded from the data analysis. Ten participants of the 16 competitors produced at least one finishing move in both the trial and tournament periods. Table 6.4 displays the kill ratios for the sample of 10 participants (who are identified as their fighter, rather than by name). During the trial period, the mean kill ratio for the sample was .67 (i.e., sixty-seven percent of responses were a fatality), whilst the mean kill ratio during the tournament rose to .84 .

TABLE 6.4: Kill ratios (\%) for the trial and tournament for 10 participants during Study 6.

| Participant's Game Character | Kill Ratio (\%) |  |
| :---: | :---: | :---: |
|  | Trial | Tournament |
| Smoke \#1 | $7 / 12$ (58) | 12/16 (75) |
| Sindel | 11/13 (85) | 10/12 (83) |
| Kabal \#1 | 8/10 (80) | 5/6 (83) |
| Kabal \#2 | 4/9 (44) | 10/10 (100) |
| Sonja | 3/11 (27) | 1/4 (25) |
| Smoke \#2 | 8/9 (89) | 8/9 (89) |
| Суrax | 5/7 (71) | 4/4 (100) |
| Sub Zero \#1 | 5/7 (71) | 5/5 (100) |
| Sub Zero \#2 | $7 / 8$ (88) | 1/1 (100) |
| Sub Zero \#3 | 1/2 (50) | 1/1 (100) |
| Total | 59/88 (67) | 57/68 (84) |

An examination of the kill ratios across the sample reveals that seven competitors had a higher kill ratio in the tournament relative to the trial period, two competitors had a lower kill ratio in the tournament relative to the trial period, and one competitor displayed no change at all. A one-tailed Wilcoxon Signed-Ranks test was performed on these data in order to test the experimental hypothesis that the sample would display a higher kill ratio in the tournament
than in the trial period. The Wilcoxon T-statistic was statistically significant, $\mathrm{T}=2, \mathrm{p}<.01$, thus supporting the experimental hypothesis.

### 6.3.4 Discussion

The findings presented from this study indicate a successful demonstration of the competition-aggression link. Participants, who were highly proficient at the Mortal Kombat videogame, tended to kill their opponent's game character with greater regularity when placed in a situation of high competition relative to a low competitive situation. Seven of the ten competitors, who produced responses in both competitive situations, were found to have a higher kill ratio during the tournament, and only one participant demonstrated a lower kill ratio. The most plausible explanation of these data is that the highly competitive situation increased the likelihood that the competition-aggression schema was primed by the situation which, in turn, increased the chances of winning participants choosing an aggressive response during videogame play. This effect was demonstrated using highly experienced players which is contrary to Anderson and Morrow's contention that the competitive situation must be novel if aggression is to arise.

An alternative explanation for these findings is that the playing experience of the trial period caused a relaxation state in competitors that lowered internal restraints towards aggression during the toumament. Thus, the higher aggressive responding during the tournament situation was produced by a transference effect (i.e., lowering of restraints) from the trial period. However, this explanation is highly improbable given the large time delay (of 1 week) between the trial period and tournament situation.

Despite the clarity of these findings, there are several reservations concerning the conclusion that the competition-aggression link has been successfully demonstrated in this study. An immediate observation suggests that these data are unreliable insofar as the increases in kill ratios were small for some participants, and that the number of responses by some participants were quite low for the trial period and/or tourmament situation. Put another
way, these data are unreliable because the kill ratios either increased marginally or were based on a small number of frequencies.

Further reservations concerning these findings are based on the differential characteristics of the low and high competitive situations. In an ideal situation, the high competitive situation should be equal in all respects to the low competitive situation except on several (or less) factors which are manipulated by the experimenter. However, this was not the case in the present study. For example, the tournament was played in the presence of an audience (predominantly of males) which was a confounding factor in the experiment. Borden and Taylor (1973) showed that the mere presence of an audience increases competitive aggression, and that a persuasive audience can elicit aggressive behaviour. It could be argued that the mere presence of the audience in this study caused the higher level of aggression during the tournament or that the adolescents were prone to produce killing responses in the presence of other males as a demonstration of 'macho' behaviour. Regardless of which interpretation is the most plausible, it appears that the confounding factor of an audience may have caused (or at least contributed) to the increased kill ratios during the tournament situation, assuming, of course, that these data are reliable.

Finally, the methodological characteristics of this study are highly disparate from the studies in Chapter 5 in which none of the experimental hypotheses were supported by the obtained data. Consequently, it is difficult to determine which factors caused the higher kill ratios during the tournament. There are a number of factors that could have caused these findings. These include the utilisation of males only, the utilisation of highly proficient videogame players, the ecological competitive situation, and/or the incorporation of rewards. The subsequent studies in this thesis attempt to evaluate the merit of some of these factors.

In light of these reservations, the rationale for conducting the next two studies was twofold. Firstly, to replicate the findings of this study and thus increase the reliability of the competition-aggression link. Secondly, assess the experimental importance of two situational factors (viz, the reward and the tournament situation) with respect to the competitionaggression link.

### 6.4 Study 7:

## Mortal Kombat Tournament Without Prizes

### 6.4.1 Introduction

A number of studies reviewed from the competition-aggression literature have examined the causal influence of a reward on competitive aggression. ${ }^{4}$ Rocha and Rogers (1976) found that children displayed greater verbal and physical aggression when competing for a desirable reward during a block building exercise. In contrast, Grossack (1954) found that a reward did not increase hostile comments between females during a written communication task, although this study was criticised for its failure to inform subjects as to the nature of the reward. There have also been a number of studies on this topic using Taylor's reaction time procedure. There have been two approaches taken by researchers. Some studies have examined the influence of a monetary reward for winning a reaction time trial (Gaebelein \& Taylor, 1971), which is comparable to Rocha and Roger's and Grossack's approaches. These studies have not demonstrated an increase in competitive aggression relative to when subjects are not competing for money. However, other studies have presented evidence in which the subject receives a higher monetary reward for behaving more (Borden et al., 1971; Dengerink, 1971; Gaebelein, 1973a, 1973b) or less (Pisano \& Taylor, 1971) aggressively during competition. The former type of studies have consistently shown that monetary rewards increase the shock set by male subjects, however, Gaebelein (1973b) revealed that females are less likely to be swayed by monetary rewards. For the latter type of study, Pisano and Taylor (1971) revealed that a monetary reward can lead to a reduction in competitive aggression. For

[^27]all intents and purposes, the current investigation was concerned with studies by Rocha and Rogers (1976), Grossack (1954), and Gaebelein and Taylor (1971) where subjects are rewarded for winning.

The current study was undertaken because of the contradictory evidence between Rocha and Rogers (1976) and those of Grossack (1954) and Gaebelein and Taylor (1971) on the empirical effect of a reward on competitive aggression. This study also adds to an existing dearth of research on this topic. The methodology employed here constitutes a systematic replication of Study 6 i.e., a toumament situation without rewards.

Adolescent males, who constituted a self-selected sample of high school students, played a videogame at which they were proficient under a low competitive situation (i.e., a trial period) and a high competitive situation (i.e., a tournament). Like the previous study, the low competitive situation was treated as a baseline measure of each participant's kill ratio, while the high competitive situation was the repeated measure. Participants were not competing for prizes during the tournament. It was hypothesised that the mean kill ratio for the high competitive situation would be equal to the mean kill ratio for the low competitive situation.

### 6.4.2 Methodology

## Participants.

Participants were 16 male high school students. Fourteen participants were 15 years old, and two participants were 16 years old. All participants were highly proficient at MK3. Ten participants from this study were competitors from Study 6.

## Recruitment.

Recruitment for this study was conducted in the same manner as Study 6. A notice was placed in the school's morning newsletter informing students of an information session about this tournament. Since MK3 has an MA classification, participants were not permitted to
compete if they were less than 15 years of age. The notice suggested that all 16 competitors would receive a $\$ 5$ gift voucher at the completion of the tournament, and that prizes were not being offered to the tournament winners.

## Procedure.

This study was conducted over a 3-week period like Study 6. The first week constituted the information session and informal practice sessions; the second week was the trial period; and the third week was the tournament itself. At the completion of the tournament, all competitors were awarded a $\$ 5$ gift voucher for the local shopping centre, but no prizes were offered to the better players of the tournament. Since 10 competitors had participated in the previous study, a cover story was provided as to why there were no prizes or trophies in this toumament in order to lessen suspicions about the aims of the study. Participants were told that university funds were quite low at this time of year and that the author was unable to raise sufficient funds to conduct a tournament with prizes.

## Kill Ratios.

The procedure for scoring kill ratios in Study 6 was employed in this study. Once again, a second person, who was blind to the study's aims, scored the videotapes by measuring participants' kill ratios. There was disagreement between the author and the second rater on a single response produced during the trial period. This response was consequently excluded from the data analysis.

### 6.4.3 Results

Participants who failed to produce a finishing move in the trial period and/or tournament were excluded from the data analysis. Eleven participants of the 16 competitors produced at least one finishing move in both the trial and tournament periods. Table 6.5 displays the kill
ratios for the sample of 11 participants (who are identified as their fighter, rather than by name). During the trial period, the mean kill ratio for the sample was .77 (i.e., seventy-seven percent of responses were a fatality), whilst the mean kill ratio during the tournament rose slightly to 83 .

An examination of the kill ratios across the sample shows that seven competitors had a higher kill ratio in the tournament relative to the trial period, three competitors had a lower kill ratio in the tournament relative to the trial period, and one competitor displayed no change at all. A one-tailed Wilcoxon Signed-Ranks test was performed on these data in order to evaluate the hypothesis that the sample would not display a higher kill ratio in the tournament than in the trial period. The Wilcoxon T-statistic was not statistically significant, $\mathrm{T}=19.5$, n.s.

TABLE 6.5: Kill ratios (\%) for the trial and tournament for 11 participants during Study 7.

| Participant's Game Character | Kill Ratio (\%) |  |
| :---: | :---: | :---: |
|  | Trial | Tournament |
| Sub Zero \#1 | $6 / 7$ (86) | $5 / 5$ (100) |
| Sub Zero \#2 | 1/1 (100) | 0/4 (0) |
| Sub Zero \#3 | 9/11 (82) | $7 / 7$ (100) |
| Kabal | 8/9 (89) | 5/6 (83) |
| Sub Zero \#4 | 7/10 (70) | 9/9 (100) |
| Sub Zero \#5 | $0 / 1$ (0) | $2 / 2$ (100) |
| Smoke | $7 / 8$ (88) | $6 / 6$ (100) |
| Sub Zero \#6 | $7 / 8$ (88) | 2/6 (33) |
| Sub Zero \#7 | $2 / 2$ (100) | 3/3 (100) |
| Sub Zero \#8 | 10/12 (83) | $6 / 7$ (86) |
| Sub Zero \#9 | 3/5 (60) | $5 / 5$ (100) |
| Total | 60/74 (77) | 50/60 (83) |

### 6.4.4 Discussion

The results of this study confirm that a reward is an important factor in demonstrating the competition-aggression link. These findings are consistent with Rocha and Rogers (1976)
who found that children were more aggressive (both verbally and physically) when competing for coveted rewards, and are also consistent with the observations made in the literature review that most studies on the competition-aggression link have utilised a salient reward for participants. It was hypothesised, on the basis of these observations, that excluding the reward of gift vouchers and trophies from the tournament (as described in Study 6) would reduce the likelihood of finding an effect.

Placing the reward issue aside for the moment, there has been a failure to replicate the positive findings of Study 6. These results reduce our confidence in the empirical link. A related issue is the fact that the sample size for each study was rather low. This may explain the inconsistent findings. This would imply that had a larger sample been utilised in both studies, then the competition-aggression link would have been found using either methodology i.e., with and without the reward. However, it is stressed that the results from the present investigation do not 'prove' that a competitive situation with a reward will produce the effect, whilst a competitive situation without a reward will not produce the effect since (in theory) nearly all variables have a minor impact on other variables during experimentation. Rather, what is being said is that the absence of the reward reduces the probability of finding the effect, and that the utilisation of a larger sample is an additional factor that increases the power of a study. The following study reports a procedure that attempts to utilise a larger number of participants under a rigorous methodology.

### 6.5 Study 8 :

## The Mortal Kombat "Challenge" (competition without an audience)

### 6.5.1 Introduction

It has been suggested that a potential confounding factor in Study 6 was the inclusion of an audience during the tournament situation (see Section 6.3). It is difficult, therefore, to make conclusive statements as to whether the higher level of competition (i.e., the tournament situation) produced the experimental effect and/or whether the audience facilitated the aggressive videogame play. A study was thus conducted to evaluate whether the putative link generalises to a competitive situation that has less 'mundane realism'. Past research suggests that the competition-aggression link generalises to relatively contrived situations such as a reaction time task involving electric shock (e.g., Taylor, 1967). If the competition-aggression link is a reliable empirical effect, and represents a cognitive-behavioural mechanism, a more contrived experimental situation should yield the effect.

On a theoretical level, the utilisation of a repeated measures methodology afforded the opportunity to examine the predictions based on Anderson's model of aggression. This model offers two plausible theories of the competition-aggression link (see Chapter 4). The schema theory interpretation of the competition-aggression link (CAST) is a cognitively driven explanation that predicts 'affectless' aggressive behaviour during competition. The negative affect interpretation (CANT), in contrast, predicts that participants will perform aggressive behaviour whilst in a state of affect e.g., anger or hostility. That is, aggression is paralleled by a negative affective state. To date, the study by Anderson and Morrow (1995) is the only one that has reported data relevant to this theoretical issue. The authors reported evidence supporting CAST insofar as university students did not self-report hostile feelings when playing a videogame task during a competitive or cooperative situation. However, there have been no studies conducted on adolescents that have tested these theories, nor has there been a
study using experienced videogame players as Anderson and Morrow utilised students who had never played Super Mario Brothers before.

An important issue on the measurement of affect is related to research on the effects of violent videogames. Several studies have shown that videogames (Anderson \& Ford, 1986; Ballard \& Wiest, 1996) and virtual reality games (Calvert \& Tan, 1994) lead to an increase in participants' hostility levels. Ballard and Wiest (1996) report the most relevant study to the current investigation as the experimental videogame was Mortal Kombat i.e., an earlier version of the videogames utilised in this chapter. Ballard and Wiest found that university students who played Mortal Kombat reported higher levels of hostility across several measures (e.g., Buss-Durkee Hostility Inventory) relative to participants who played a relatively non-violent videogame. Most importantly, Ballard and Wiest showed that the highest levels of hostility were indicated by participants who played the most violent version of Mortal Kombat (i.e., blood and gore was shown during game play). Since the most violent version of Mortal Kombat was used in the current studies, it was important to incorporate a baseline affect measure in order to account for increases caused by the violent content of the videogame, as opposed to increases caused by the competitiveness factor.

Two general hypotheses were thus proposed for this study:

Hypothesis 1: Participants will produce a higher kill ratio during a competitive situation involving a reward in comparison with a baseline competitive situation without a reward; and Hypothesis 2: Participants will not report greater feelings of anger across the low and high competitive situations. That is, the CAST interpretation of the competition-aggression link will be supported by these data. This hypothesis follows from Anderson and Morrow's findings of 'affectless' aggression amongst university students.

### 6.5.2 Methodology

## Participants.

Participants for this study were 22 male high school students. Twelve participants were 15 years old, and 12 participants were 16 years old. All participants were experienced Mortal Kombat players. Ten of the 22 participants had competed in Study 6 and/or Study 7.

## Recruitment.

Recruitment for this study was conducted like Studies 6 and 7. A notice was placed in the school's morning newsletter informing students of an information session about this tournament. Since Ultimate Mortal Kombat 3 (UMK3) has an MA classification, students were only encouraged to attend the information session if they were at least 15 years old. The notice added that participants would be competing for prizes. Since the MK tournaments were well known in the school by this stage, many students received information about the 'MK Challenge' through hearsay, rather than from the newsletter.

## Materials.

Ultimate Mortal Kombat 3 (UMK3) was the experimental videogame. UMK3 is the fourth Mortal Kombat videogame in the series and combines all the fighters from the previous three versions. Despite having a greater number of fighters, UMK3 is equal in all other respects to the other versions.

Three scales were administered in this study. The first scale was the S-Anger Scale from the State-Trait Anger Expression Inventory (Spielberger, 1991; Spielberger et al., 1983). The S-Anger Scale is composed of 10 items that measure the current intensity of angry feelings. Each item (e.g., "I feel irritated.") is rated on a 4-point scale. The STAXI is a widely validated inventory. Two further scales were utilised in this study, viz, Positive and Negative Affect Scales (Watson, Clark, \& Tellegen, 1988). The Positive and Negative Affect Scales
each consist of 10 adjectives which describe different feelings and emotions. Ten adjectives describe negative moods (e.g., distressed, upset, guilty) and ten adjectives describe positive moods (e.g., interested, excited, inspired). Respondents rate each adjective on a 5-point scale. Both affect scales have been widely validated. For ease of administration of all three scales, the S-Anger scale was combined with the 20 adjectives from the PANAS (see Appendix C) and was labelled the 'Feeling Schedule'. Adjectives from all three scales were rated on the PANAS 5-point scale (despite the fact that the original S-Anger scale has 4 points). The rating scale for the PANAS is highly similar to the S-Anger Scale despite having an extra point. Since the S-Anger Scale was being utilised as a repeated measure, it was argued that the adoption of a 5 -point scale would not alter the essential qualities of the scale. The PANAS scales and the S-Anger scale have a range of 10-50.

## Procedure.

The methodological procedures of this study varied markedly from the previous studies in order to alter the competition from a tournament-type event. This study was conducted over approximately four weeks. Once again, a notice was placed in the high school's newsletter about an information session the next day on the new Mortal Kombat competition. During the information session, potential participants were told that a MK 'Challenge' was being conducted on this occasion, as opposed to a tournament-type competition. During the Challenge, participants, who would be paired with another Mortal Kombat player deemed to be of equal ability, would compete for a $\$ 10$ gift voucher over a lunch period. Potential participants were given an information package like those distributed in the previous studies. Students were requested to return a signed consent form if they wished to participate in the Challenge.

During the following two weeks after the information session, practice sessions were conducted during recess and lunch in order to evaluate the relative abilities of each player. Since nearly half of the players had participated in the previous studies, the author already had
a clear idea as to who was proficient at Mortal Kombat and who was less proficient. Most recess and lunch periods were spent wth the researcher observing everybody play UMK3. Participants were instructed to nominate a fighter they would use during the Challenge. At the completion of the two weeks, participants were paired up, and a schedule was placed outside of the building where the experimental sessions were held. Participants were instructed to come during the lunch hour of their designated day.

When participants arrived during a lunch period for the Challenge session, they were escorted to the experimental area and requested to complete the Feeling Schedule. Participants were then allowed to practice on UMK3 for a period of 20 minutes. This playing period acted as the baseline measure. At the completion of the 20 minutes, participants were re-administered the Feeling Schedule. Upon completing the Feeling Schedule for the second time, participants competed in the Challenge proper. Participants were told that they were competing over a 20 -minute period and that the player who won the greatest number of games would be deemed the champion and would receive a $\$ 10$ gift voucher. Participants were also instructed that a deciding game would be played in the event of a draw at the end of the 20minute period. The author acted as the referee and maintained a running score of the match at the end of each game. Once the Challenge had ended, participants were requested to complete the Feeling Schedule for the final time.

A debriefing session was advertised through the school's morning newsletter a week following the completion of Study 8. Students from all three Mortal Kombat studies were strongly urged to attend the session so they could become knowledgeable of the aims and findings of each study. Twenty Mortal Kombat players attended the debriefing session. Participants were initially requested to guess each study's aims. Not a single person mentioned an approximation of the primary aims of the Mortal Kombat studies, although two participants suggested violent playing moves were being examined (but were unsure of their nature). MK participants who did not attend the session were posted a short summary of the project's aims and findings with contact details for further information.

## Kill Ratios.

The procedure used for scoring kill ratios in Study 6 was employed in this study. Once again, a second person, who was blind to the study's aims, scored the videotapes by measuring participants' kill ratios. There was perfect agreement between the ratings made by the author and that of the independent rater.

### 6.5.3 Results

## Kill Ratios.

One participant was excluded from the data analysis because of the failure to produce a finishing move during the Challenge. The remaining 21 participants produced at least one finishing move both during the baseline and challenge periods. Table 6.6 shows the kill ratios for the sample of 21 participants. Once again, participants are identified as their fighter rather than by name. During the baseline period, the mean kill ratio was .58 (i.e., fifty-eight percent of responses were a fatality), whilst the mean kill ratio during the challenge period increased to .71 .

It was observed that 16 participants demonstrated a higher kill ratio during the Challenge period in comparison to the baseline, three competitors had a lower kill ratio in the Challenge period relative to the baseline, and two participants displayed no change at all. A one-tailed dependent samples $t$ test was conducted to test the significance of the difference in mean kill ratios, across the time periods. The $t$ value was statistically significant, $t(19)=-2.68, p<.01$. That is, on average, participants demonstrated a significant increase in the tendency to kill the opponent's game character during the Challenge period.

TABLE 6.6: Kill ratios (\%) for the baseline and "Challenge" periods for 21 participants during Study 8.

| Participant's Game Character | Kill Ratio (\%) |  |
| :---: | :---: | :---: |
|  | Baseline | Challenge |
| Scorpion \#1 | 2/4 (50) | $1 / 2 \quad$ (50) |
| Stryker | 7/10 (70) | 8/9 (89) |
| Kabal \#1 | 5/10 (50) | 6/12 (50) |
| Sub-Zero \#1 | 1/5 (20) | 5/6 (83) |
| Reptile \#1 | 7/9 (78) | 6/7 (86) |
| Sub-Zero \#2 | 1/2 (50) | 5/7 (71) |
| Scorpion \#2 | $7 / 8$ (88) | 1/5 (20) |
| Kabal \#2 | 4/7 (57) | 7/12 (58) |
| Sub Zero \#3 | 4/6 (67) | 6/6 (100) |
| Reptile \#2 | $8 / 9$ (89) | 10/10 (100) |
| Reptile \#3 | 4/8 (50) | 5/6 (83) |
| Sub-Zero \#4 | 6/10 (60) | 1/7 (14) |
| Sub-Zero \#5 | 7/13 (54) | 9/13 (69) |
| Sub-Zero \#6 | $1 / 2$ (50) | $2 / 2$ (100) |
| Sektor \#1 | 4/8 (50) | 8/12 (67) |
| Smoke | 1/7 (14) | 0/3 (0) |
| Sektor \#2 | 3/7 (43) | 2/3 (66) |
| Sindel | 2/7 (29) | $6 / 7$ (86) |
| Kabal \#3 | 5/7 (71) | $7 / 7$ (100) |
| Reptile \#4 | 5/8 (63) | 7/10 (70) |
| Sub-Zero \#7 | 4/7 (57) | 5/5 (100) |
| Total | 88/153 (58) | 107/151 (71) |

Positive Affect, Negative Affect, \& Angry Feelings.
Table 6.7 shows the mean scores across the three time periods on PANAS and S-anger scales. An examination of the table suggests the mean trends across time were not in the direction as predicted by CANT. For example, the negative affect means increased from the baseline period to the post-practice period, but fell during post-Challenge. Likewise, mean positive affect scores increased from baseline to post-practice, but fell subsequently in the Challenge period. In contrast, the mean anger scores displayed a trend consistent with the predictions of CANT in that there was an increase in angry feelings at each time period.

Notwithstanding these inconsistent trends, the change scores were very small across the three time periods. The change scores across all three measures ranged from .5 to 4.7 which represent small changes since each scale has a range of scores varying from 10 to 50 . Another observation of these data is that the standard deviations tended to increase across the periods implying a greater variation of responses through time. This is particularly typical for the negative affect and state anger scales where the initial baseline scores were at the lower end of the continuum of 10 . Initial parametric analyses (i.e., repeated measures tests) showed a violation of the equal variances assumption on the positive affect and state anger scores. Transformations of these data (i.e., square root and reciprocal transformations) did not alleviate this violation of the equal variance assumption. Consequently, the non-parametric equivalent test for repeated measures design was utilised to analyse these data i.e., Friedman's Analysis of Variance by Ranks. The mean ranks across the three time periods are shown in Table 6.7. The chi-square values are not significant for each scale suggesting that the means did not differ significantly across the three time periods. In addition, correlation coefficients were calculated between the feeling measures and kill ratios. There were no significant correlations between participants' feeling state and their aggressive behaviour (within or between time periods).

TABLE 6.7: Mean scores for three time periods (Pre-practice, Post-practice, and Post-Challenge period) on PANAS and S-Anger scales for 21 participants during Study 8, and mean ranks and $\chi 2$ values.

|  | Time 1 <br> (Pre-practice) | Time 2 <br> (Post-practice) | Time 3 <br> (Post-Challenge) | $\chi^{2}(\boldsymbol{p})$ |
| :--- | :---: | :---: | :---: | :---: |
| Positive affect | $29.8(8.1)$ | $32.0(9.5)$ | $27.3(10.6)$ |  |
| Mean rank | 1.86 | 2.36 | 1.79 | $4.4(.11)$ |
| Negative affect | $15.5(5.8)$ | $16.0(6.2)$ | $15.8(7.4)$ |  |
| Mean rank | 1.98 | 2.07 | 1.95 | $<1$ |
| State anger | $13.6(5.2)$ | $15.4(9.3)$ | $18.4(12.7)$ |  |
| Mean rank | 1.95 | 1.98 | 2.07 | $<1$ |

Exploratory analyses were conducted to examine the potential association between the PANAS and state anger scores and game outcome (i.e., winning or losing during the Challenge period). Pearson correlation coefficients were calculated between positive affect, negative affect, state anger, and game outcome (i.e., winning or losing). Four of the nine correlation coefficients were statistically significant. Game outcome was positively associated with pre-practice state anger scores, $r(19)=.44, p<.05$, suggesting that eventual winners of the Challenge period reported higher levels of anger at baseline. It is difficult to interpret this correlation, although it is unsound to interpret the association as causal i.e., higher levels of state anger caused players to win. The three remaining significant correlations were at Time 3 (i.e., Post-Challenge). The positive affect, $r(19)=.50, p<.05$, negative affect, $r(19)=-.43, p<.05$, and state anger, $r(19)=-.48, p<.05$, correlation coefficients were all statistically significant. That is, winners were more likely to report higher levels of positive affect at the conclusion of the study, and lower levels of negative affect and state anger, whilst losers were more likely to report lower levels of positive affect during post-Challenge stage, and higher levels of negative affect and state anger. Thus, whilst the PANAS and state anger scores did not demonstrate a trend across the time periods, they nevertheless were related to game outcome in a systematic manner.

### 6.5.4 Discussion

The behavioural data collected for this study provide strong evidence that increasing levels of competition raise a winning participant's tendency to kill the opponent's game character at the end of each game. However, this behavioural tendency, of increasing aggressiveness, was not accompanied by substantial changes in participants' self-reports of negative and positive affect, or state anger. That is, whilst the aggressive behaviour was not 'affectless', in the exact sense of the word, there was no association between affect and levels of competition. Instead, the affective state of the individual was related to the game's outcome with winners reporting higher levels of positive affect, and lower levels of negative affect and state anger.

Overall, this study has demonstrated the competition-aggression link using a larger sample size, and a larger frequency of responses from each participant (than Study 6), and has revealed evidence consistent with the CAST interpretation (i.e., schema theory) of the putative link. It is noted that the competitive aggression of this study (as well as Study 6) was produced under a situation where there was no interpersonal interaction between competitors during videogame play. That is, a partition was placed between competitors during the experiment such that aggressive videogame play was uninfluenced by extraneous factors e.g., body language, communication.

The reported finding of 'affectless' aggression during videogame play across different levels of competition raise critical issues conceming the contradiction in these findings and those reported by Ballard and Wiest (1996) who showed that players were more hostile after playing Mortal Kombat. These contradictory findings are difficult to explain by alluding to methodological differences between the studies since they were similar in design. For example, Ballard and Wiest's subjects played for a period of 20 minutes, whilst the current participants played for 15 minutes in each period; both studies utilised a repeated measures design; the experimental videogames were from the same series; and a paper-and-pencil test was utilised to measure affect in each case.

Despite these commonalities in methodological design, there were some differences in the studies that may explain the contradictory findings. One explanation derives from the observation that Ballard and Wiest (1996) measured hostility, whilst the present participants were making ratings according to anger. This implies that participants would have demonstrated increased hostility levels across the time periods if a hostility measure had been utilised in the current study (e.g., the Buss-Durkee Hostility Inventory). Put another way, an anger scale was an inappropriate (and perhaps insensitive) measure for evaluating participants' affect. However, it is recalled that the conceptual analysis of Chapter 2 argued that anger is a well developed concept in psychology, whilst hostility is a poorly developed concept, which implies that the findings based on the STAXI are probably more reliable than those derived from any scale based on the notion of hostility. This statement is even more
compelling when the Buss-Durkee instrument is closely scrutinised. The Buss-Durkee Hostility Inventory tends to measure a propensity towards hostile behaviour (e.g., "Once in a while I can't control the urge to hit another person"), rather than measuring the current state of the subject (which is what the authors were actually assessing), implying that Ballard and Wiest probably utilised an inappropriate scale for a short-term examination of each participant's feeling state. The argument that the STAXI was an inappropriate scale for the present study is further weakened by the association between game outcome and affect, viz, winners were less likely to report angry feelings and negative affect than losers.

Perhaps a more plausible explanation for these findings refers to the procedural aspects of this study. Recall that participants completed the Feeling Schedule following a playing period, rather than completing the items as they were competing. The point here is that the temporal delay between competitive aggression (e.g., fatality) and the measurement of affect (i.e., S-Anger) permitted the infiltration of confounding factors e.g., the affect associated with winning or losing. This explanation is consistent with the association between game outcome and state anger because it implies that participants were displaying angry aggression during the Challenge (larger than the other time periods), however, the affect caused by winning or losing the $\$ 10$ gift voucher was an overriding influence on the affect of game play. Thus, participants may have been more angrier during the Challenge period. Ballard and Wiest found that participants were more hostile after playing Mortal Kombat because the experimental procedure was not a competitive situation for prizes.

An alternative explanation suggests that participants were actually demonstrating 'affectless' aggression. The contradictory evidence between this study and Ballard and Wiest (1996) are perhaps the result of the different types of participants utilised in each study. Recall that Ballard and Wiest's subjects were university students who had little experience with the videogame (and maybe little experience with videogames in general), whilst the current participants were highly experienced at Mortal Kombat. This playing experience factor may imply an habituation to competitive violence by the experienced Mortal Kombat players who, after countless hours of practice, no longer emotionalise to this type of
videogame play. There are two reasons why experienced players may not be angry when playing this videogame. Firstly, success at this videogame (as for most competitors) may be conditional on players developing an affective habituation to the learned task. For example, most elite athletes demonstrate intense concentration during highly competitive situations. ${ }^{5}$ This argument is supported by many metaphors to describe experienced competitors (e.g., "Mr Cool on the Court") as well as sporting adages that reflect a calmness during competition (e.g., "keeping your head", "absorbing the pressure"). Secondly, repeated experience with this violent videogame may result in a habituation to the violent stimuli. Either way, a consequence of drawing from sub-populations who are experienced at a violent videogame for studies based on competition is that the cognitive route is the most probable pathway towards aggressive behaviour. The hypothesis of habituation to the videogame does not contradict Anderson and Morrow's 'affectless' aggression because they used a non-violent videogame. Further research is required to examine the affective response of competitors using a number of different measures, varying experience with videogames and/or with the experimental task, and a wide range of age groups.

The question remains as to which alternative explanation is the more plausible. There is no easy way to reconcile this debate since both explanations are equally plausible. At face value, we must conclude that the videogame aggression displayed by experienced adolescent male players is 'affectless' (thus supporting CAST). However, this statement is far from conclusive. Further research is required to test these theories in a more rigorous manner. One way of testing them more adequately entails measuring affect using an indirect measure (e.g., physiological responses which correlate with angry feelings) during the process of videogame play, rather than using a direct measure after the playing period.

[^28]
### 6.6 Study 9:

## Validation of the Mortal Kombat Kill Ratio

### 6.6.1 Introduction

A major criticism of the literature is the disproportionate number of studies on the nature of aggression with relatively few studies devoted to the validation of dependent variables of aggressive behaviour (Geen, 1976). The review of the competition-aggression literature (see Chapter 3) vindicated this criticism since many of the studies employed questionable or dubious measures of aggression. For example, Anderson and Morrow (1995) failed to validate the kill ratio construct even though they reported evidence consistent with the putative link. In the current context, it is an important exercise to conduct a validation study in order to ascertain whether the kill ratio measure (as derived from Mortal Kombat) reflects social aggression.

The purpose of a validation study is to examine "the extent to which a measure reflects a concept, reflecting neither more nor less than what is implied by the conceptual definition" (Jackson, 1995, p. 332). There are various types of validity that the kill ratio measure can be assessed for (e.g., 'face validity', 'concept validity', 'construct validity'), however, the most efficient methodology is to correlate the aforesaid measure with another valid measure of aggression. This is referred to as 'concurrent validity'.

There are several types of aggression measures in the literature that could be appropriately utilised to assess the concurrent validity of the Mortal Kombat kill ratio. However, some measures are more convenient and effective than others. The behavioural observation of adolescents across a range of settings (e.g., class room, school yard) constitutes the most desirable assessment procedure (Cone, 1978), but is time consuming and costly. For example, Deluty (1985) reported a behavioural observation study of 50 children (7-10 years old) which took 13 independent observers approximately 8 months to collect enough data to
ascertain each child's aggressive propensity. Limited resources in the present investigation prevented the use of this type of procedure, not to mention the intrusiveness of this approach on participants. The most practical method for measuring aggression are ratings made by peers, parents, or teachers. The current study utilised teacher ratings of participants' aggression for a number of reasons. Firstly, aggression ratings from teachers, peers, and parents, tend to correlate highly for non-clinical samples (Epkins, 1996). Secondly, unlike peers and parents, some teachers, in the present study, could rate all Mortal Kombat participants on aggressive behaviour. Finally, teacher ratings have been found to correlate with frequency of videogame play (Fling, Smith, Rodriguez, Thornton, Atkins, \& Nixon, 1992; Lin \& Lepper, 1987).

In addition to ratings made by teachers, self-reports were also employed as an alternative procedure. Empirical evidence tends to show that self-reports perform poorly in comparison to teacher ratings, particularly for adolescent samples. For example, Shapiro, Lentz, and Sofman (1985) found that adolescents' self-reports of aggression, based on the Children Assertive Behaviour Scale, failed to correlate with displayed aggression in class, but that teacher ratings, using the same scale, were positively correlated with actual aggression. Graybill and Blackwood (1996) reported that teacher ratings (and not self-reports) correlated highly with adolescents' actual aggressive behaviour within the same context (i.e., the class room).

On the basis of this evidence, two hypotheses were formulated for this validation exercise:

Hypothesis 1: The Mortal Kombat kill ratio will correlate positively with teacher aggression ratings i.e., demonstrate concurrent validity; and

Hypothesis 2: The kill ratio measure will not correlate with self-reports of aggression.

An additional type of validity specifically for videogames is 'perceptual validity'. Anderson and Ford (1986) inadvertently discovered this validity when they attempted to match two independent videogames on all variables except the violence dimension. This type
of validity assesses whether participants actually perceive a violent videogame consistent with the perceptions of the researcher. Perceptual validity is an important concept since the aggression performed within a videogame is a symbolic representation, unlike most of the measures utilised in the aggression field which tend to entail the participant behaving either verbally or physically aggressive. Put another way, the player is pressing buttons on a joypad (which are non-aggressive acts), however, the symbolic acts on the television screen are interpreted by the player as aggressive, less aggressive, or non-aggressive. The violent television field has shown that perceptions of violence tend to change with factors such as patterns of use, age, gender, and context. Therefore, it is appropriate to assess the Mortal Kombat kill ratio not only on concurrent validity, but also on the less common concept of perceptual validity. It was further hypothesised that:

Hypothesis 3: Participants will perceive the playing moves that constitute the Mortal Kombat kill ratio (i.e., a 'fatality') as aggressive, relative to other playing moves.

### 6.6.2 Methodology

## Participants \& Survey.

The Mortal Kombat players from Study $8(\mathrm{n}=22)$ were administered a survey during the practice sessions of the last study. The survey was designed to measure a participant's perceptions of all playing moves from Ultimate Mortal Kombat 3 (as an indication of perceptual validity), as well as measure self-reports of aggressive behaviour derived from responses on the Children Assertive Behavior Scale (CABS).

Participants were instructed to rate each playing move of Ultimate Mortal Kombat 3 (UMK3) on a 7-point scale (see Appendix C). A total of 14 playing moves were listed e.g.,
high kick, babality, fatality, low kick, block. ${ }^{6}$ Two additional items were included in the survey where the respondent rated the realism and general violence level of UMK3. A rating of ' 1 ' on the 7 -point scale was 'not violent', a rating of ' 4 ' was 'moderately violent', and a rating of ' 7 ' was 'extremely violent'.

The CABS, which is a self-report form, was developed because of the dearth of measuring instruments for child and adolescent aggressive behaviour (Michelson \& Wood, 1982). The CABS long form has 27 items, while the CABS short form has 12 selected items for faster completion time. The short form of CABS was utilised in this study. Each item has five possible alternatives that vary along a 'Passive-Assertive-Aggressive' continuum. The most passive response is assigned a -2 , whilst an aggressive response is assigned a +2 . The respondent is provided a hypothetical situation for each item and is requested to select a behaviour that most reflects the way in which they would respond if placed in that situation. The range of possible scores on the CABS short form is $\mathbf{- 2 4}$ to +24 . The CABS has been validated on children (Michelson \& Wood, 1980; Michelson \& Wood, 1982; Van Hasselt, Hersen, \& Bellack, 1984) and adolescents (Michelson, Andrasik, Vucelic, \& Coleman, 1981).

## Teacher Ratings.

Teacher ratings were also used as a measure of participants' propensity for aggressive behaviour. The lack of instruments validated in the Australian context and on adolescent samples warranted the development of a scale for aggressive behaviour. A procedure was thus devised that was not time consuming and relatively easy to undertake by teacher raters. A successful procedure in the literature, that has satisfied these requirements, has been a simple rating scale preferably based on a conceptual definition of aggression (e.g., Fling et al., 1992; Lin \& Lepper, 1987).

[^29]Two teachers were instructed to rate each participant's propensity for aggressive behaviour. They had both taught each student for (at least) one semester of a generic class (e.g., Media Studies). Each teacher was provided a definition of non-instrumental aggression (i.e., "an overt action that is intended solely to inflict harm on the recipient") as the Mortal Kombat kill ratio aggression is indicative of a non-instrumental response. ${ }^{7}$ Each teacher was requested to focus on both verbal and physical behaviours that were unacceptable, inappropriate, and/or illegitimate, in the school setting. What constituted 'unacceptable', 'inappropriate', or 'illegitimate', behaviours, was completely left to each rater. ${ }^{8}$ Each rater was instructed to make assessments on a 10 -point rating where ' 1 ' was equivalent to 'not aggressive at all', ' 5 ' was 'moderately aggressive', and 10 was 'extremely aggressive'. One teacher suggested that approximately 2-3 students in the school would score ' 9 ' or ' 10 ' on this scale and that these students displayed problem aggression which created impediments to learning. Each teacher rated the Mortal Kombat participants on two scales, viz, aggressive behaviour towards peers (TSA-p) and teachers (TSA-t).

For the purposes of a test-retest reliability analysis, one teacher was requested to rate each player, once again, using the TSA-p and TSA-t scales some 12 months after completing the initial ratings. Pearson correlation coefficients showed that each scale had acceptable testretest reliability. The TSA-p, $r(18)=.82, p<.001$, and the TSA-t, $r(18)=.72, p<.001$, scores were significantly correlated across the 12 -month period. An inter-rater reliability analysis was also conducted by calculating Pearson correlation coefficients based on both teachers' initial ratings. Ratings were highly and significantly correlated on both the TSA-p, $r(18)=$ $.71, p<.001$, and the TSA-t, $r(18)=.74, p<.001$. All three sets of scores (i.e., from the two raters) were combined for subsequent analyses.

[^30]
## Kill Ratios.

The Mortal Kombat kill ratios, which were correlated with the independent measures of aggression, were taken from the baseline data of Study 8 because this study provided the largest number of cases. Baseline measures were utilised, as opposed to the Challenge period scores, because these data were probably more indicative of participants' 'real world' playing style.

### 6.6.3 Results

The concurrent validity of the Mortal Kombat kill ratio was evaluated by correlating baseline ratios from Study 8 with TSA scores. One-tailed Pearson correlation coefficients were calculated separately for teacher and peer ratings. TSA-t were significantly positively correlated with kill ratios, $r(18)=.38, p<.05$, whilst TSA-p were positively correlated with kill ratios (and approached significance), $r(18)=.35, p=.06$. Hypothesis 1 was supported by these data. The concurrent validity of the kill ratio was assessed further by correlating baseline kill ratios with self-report CABS scores. Unlike the teacher ratings, the correlation coefficient was not significant, $r(18)=-.01$, n.s.. Hypothesis 2 was supported by these data.

Table 6.8 displays the mean (SD) violence ratings of each playing move from the Mortal Kombat sample. An examination of mean scores reveals that the highest violence rating was a fatality, whilst the lowest violence ratings were a friendship, babality, and a block (which is a very defensive playing move). The remaining playing moves were rated in the middle of the 7-point scale, except for a special move, combination, and an animality, which were rated as highly violent. It is a significant finding that the kill ratio formula (viz, fatality / (fatality + babality + friendship)) was composed of UMK3 playing moves that were rated by participants as the most violent and non-violent of all moves. It is concluded that Hypothesis 3 was supported by these data.

TABLE 6.8: Mean (SD) violence ratings of 14 playing moves from UMK3 based on a 7 -point scale, and minimum and maximum values, from a sample of 22 male Mortal Kombat players.

| Playing moves | Minimum | Maximum | Mean | S.D. |
| :--- | :---: | :---: | :---: | :---: |
| Low kick | 1 | 6 | 2.7 | 1.2 |
| High kick | 1 | 7 | 3.8 | 1.6 |
| Flying kick | 1 | 6 | 3.8 | 1.2 |
| Low punch | 1 | 7 | 2.8 | 1.4 |
| High punch | 1 | 6 | 3.9 | 1.5 |
| Block | 1 | 3 | 1.3 | .63 |
| Sweep | 1 | 4 | 2.6 | 1.0 |
| Throw | 1 | 6 | 3.4 | 1.3 |
| Special move | 1 | 6 | 4.1 | 1.4 |
| Combination | 1 | 7 | 4.8 | 1.8 |
| Babality | 1 | 5 | 1.4 | .95 |
| Friendship | 1 | 2 | 1.1 | .29 |
| Fatality | 1 | 7 | 5.6 | 1.6 |
| Animality | 1 | 7 | 4.6 | 1.7 |

General ratings of UMK3 revealed that participants rated the videogame as relatively violent ( $\mathrm{M}=4.9$; S.D. $=1.5$ ) and moderately realistic ( $\mathrm{M}=3.2$; S.D.=1.8). Comparisons with ratings of Donkey Kong Country from Study 3 ( $\mathrm{M}=1.7$; S.D.=1.0) show that UMK3 was rated at least 3 points higher with respect to violence, even though each videogame was rated approximately equal on realism ( $M=2.9$; S.D. $=1.6$ ).

### 6.6.4 Discussion

A relatively simple validation exercise has demonstrated that the Mortal Kombat kill ratio correlates moderately with propensities for aggressive behaviour towards peers and teachers (as rated by an independent observer) i.e., the kill ratio measure has concurrent validity. In addition, self-reports of aggression were not correlated with the kill ratio measure which is consistent with past research. Moreover, the Mortal Kombat kill ratio has perceptual validity since participants perceived the videogame as highly violent, and indicated that the aggressive and non-aggressive responses that comprise the kill ratio were considered as the most and least violent responses in comparison to the other playing moves of UMK3. It is noted that a
limitation of this study is that the kill ratio has not been assessed on all types of validities (e.g., predictive validity). Further research should examine the association between different types of kill ratios and constructs of aggression for various age groups, gender, and videogame experience.

### 6.7 Summary and Discussion

The first aim of this chapter was to conduct a study that contained the highest possible experimental power based on past research on the competition-aggression link. Some of these factors included an ecological competitive situation (i.e., a tournament with rewards), experienced competitors, and a violent videogame. A study was thus conducted (Study 6) which maximised experimental power by placing experienced Mortal Kombat players, who were a self-selected sample composed of all males, in a knock-out tournament for rewards. Participants' playing responses in the tournament were compared with a baseline measure taken during a less competitive situation i.e., a trial period. It was hypothesised that participants would display a higher proportion of killing responses during the tournament relative to their baseline responses. The experimental hypothesis was supported by these data, however, a low number of participants produced responses across both periods ( $\mathrm{n}=10$ ) and some participants produced a low number of responses in the tournament and/or trial period. It was concluded that these findings are tentative.

It was observed that a number of factors were altered between the tournament situation and the trial period. The tournament situation entailed playing for a reward, but it was also qualitatively different from the trial period insofar as an audience was present and participants were effectively eliminated from the competition upon losing a match. Thus, in the effort to increase experimental power, it was impossible to make conclusive statements about the influence of relevant factors of competitive aggression. Two subsequent studies were thus conducted. These studies were conducted using a process of elimination i.e., the reward
(Study 7) and tournament situation (Study 8) were stripped from the original Study 6 methodology.

Study 7 constituted a systematic replication of Study 6 insofar as an identical methodology was employed except that the tournament rewards were excluded from the design. Each participant was provided a $\$ 5$ gift voucher, at the completion of the study, for competing in the tournament. There was a failure to replicate the findings of Study 6 implying that a reward is a powerful factor in producing competitive aggression.

However, a confounding factor in Study 6 and in Study 7 was the presence of an audience during the tournament. Past research has shown that the mere presence of an audience (as well as audience persuasion) increases the probability of observing competitive aggression amongst participants. Thus, Study 8 (i.e., a competitive situation without an audience present) was conducted in order to evaluate the competition-aggression link within a less ecological competitive situation in which the baseline and experimental periods were identical in all respects other than the reward. To increase the reliability of the statistical effect, a larger sample size was employed and participants generated more responses across both periods. The findings from the Mortal Kombat Challenge supported the hypothesis that the competition-aggression link would be demonstrated using a non-ecological competitive situation (although the situation was still high on 'experimental realism' insofar that participants were engaged by the task). Sixteen of the 21 participants showed a higher kill ratio during the high competitive situation (i.e., when playing for a monetary reward) than when competing during the low competitive situation. It was concluded that the audience of Study 6 did not solely contribute to the higher competitive aggression of the tournament phase. In addition, this increased level of aggression during the Challenge period occurred in the absence of self-reported angry feelings. That is, participants were performing 'affectless' aggression (thus supporting the cognitive interpretation of the link i.e., CAST), although these findings were tempered by the procedural characteristics of the design.

A criticism of the competition-aggression literature has been the frequent failure to validate the dependent variable(s) as an aggressive behaviour. A validation exercise was thus
conducted in order to evaluate the validity of the Mortal Kombat kill ratio as aggressive behaviour. Participants' baseline kill ratios from Study 8 were correlated with self-reports of aggression, as well as teacher ratings. It was found that the kill ratios correlated positively with teachers' ratings of participants' propensities for aggression towards teachers and peers i.e., the kill ratio construct has concurrent validity. Both constructs were representative of non-instrumental aggression. There was no association between participants' self-reported aggression and kill ratios. Overall, these findings were consistent with past research from the general aggression field.

A limitation of demonstrating the competition-aggression link on a self-selected sample of male adolescents is the questionable generalisability of these findings to other adolescent subgroups i.e., females, inexperienced videogame players, and non-Mortal Kombat players. To reconcile this issue, we might compare the current sample with a general sample of school students in order to ascertain differences between the groups on a range of characteristics (e.g., competition/cooperation schemas, aggressive dispositions), but not all of this information is available. Notwithstanding this lack of information, there are indications that the Mortal Kombat sample was not altogether different from the general school population. Study 5 showed that the Mortal Kombat group had similar perceptions of competitive and cooperative situations in comparison to a general sample of adolescents. There were some differences, but these were generally minor and indirectly related to the issue. For example, the Mortal Kombat sample perceived cooperation as more aggressive than the general sample, however, the fundamental issue is whether these groups differ on the competition schema (since each study was based on low and high levels of competition). Moreover, the Mortal Kombat sample tended to play videogames to a lesser degree than the general sample. Some important potential distinctions between the groups, which would evaluate the generalisability of these findings, relate to factors such as aggressive dispositions and preferences for violent videogames.

An alternative solution for generalising these findings to other groups would be to replicate these studies using females, low-frequency videogame players, and/or inexperienced

Mortal Kombat players. However, the reality is that the studies reported in this chapter would be difficult to conduct using other groups since inexperienced players must undergo intensive training in order to become moderately competent at Mortal Kombat. The training program would enable inexperienced players to produce responses like experienced players, viz, voluntary and well controlled moves. However, there are barriers to conducting a training program for inexperienced players such as time (approximately 20-30 hours per person) and the low probability that trainees would be sufficiently competent at the completion of the program to compete in a tournament situation. Moreover, there is the issue that extensive practice at Mortal Kombat would cause a constitutional change in the psychology of the inexperienced players that would be difficult to measure or predict. Ironically, there are few alternative options for conducting the Mortal Kombat-type studies except with players who are already experienced at the videogame. As for gender differences, the fact that females were not willing to participate in the male-dominated tournament reinforce gender stereotypes about preferences for violence, videogames, and/or competition.

On a separate issue, a minor shortcoming of these studies was the ordering of the methodologies. In retrospect, Study 8, which utilised a more reliable methodology than Study 7, could have been conducted first. If Study 8 had been conducted first and a significant finding reported, this would have led to a similar design (i.e., a Challenge competition) for Study 7 in order to ascertain whether a monetary reward is an important factor in competitive aggression. That is, Study 6 would have been the only tournament-type study, and Study 7 would have employed a methodological design like Study 8 (except for the monetary reward manipulation). However, time and funding prevented the replication of Study 7 using a methodology based on Study 8. Moreover, it is difficult to conceptualise the nature of Study 7 if a methodological design was utilised modelled on Study 8. Such a study might have entailed participants practicing against each other for 15 minutes, and then competing for a further 15 minutes under a simulated highly competitive situation (e.g., playing to win only). It is concluded that this type of study would have provided a weak test of the effectiveness of a reward.

Finally, recall that the studies reported in Chapter 5 were criticised on the conceptual basis that the competitive and cooperative situations were too similar with respect to aggressive outcomes (based on the conceptual framework formulated in Chapter 2). In contrast, the Mortal Kombat studies were constructed in a conceptually sound manner. The task was means-interdependent (i.e., subjects were competing against each other within the same game) and the goals factor was contriently interdependent. That is, each situation (i.e., trial period and tournament) was positioned in Quadrant 1 of Figure 2.1, a type of competitive situation that is most likely to produce competitive aggression. The introduction of a reward did not alter the nature of the task, however, the utilisation of a reward during the tournament (or Challenge period) caused the goals to become greater. Conceptually speaking, the goals dimension of Figure 2.1 shifted upwards upon the introduction of a reward. If P1 in Figure 2.1 signified the type of competitive situation of the trial period (or baseline period), then the introduction of the reward during the tournament (or Challenge period) would result in P1 shifting upwards in response to the goals axis shifting upwards.

### 6.8 Conclusions

On the basis of the studies reported in this chapter, it is concluded that higher levels of competition (as defined by a monetary reward) has the power to increase videogame aggression in experienced male Mortal Kombat players. Participants' aggressiveness was both inconsequential and probably non-instrumental with respect to the game's outcome, and was performed by the winning participant. Moreover, videogame aggressiveness occurred in the absence of self-reported state anger and negative affect. That is, the displayed aggression under a highly competitive situation was 'affectless' which is consistent with the schema theory interpretation (CAST) of the competition-aggression link. However, these latter findings are highly tentative. An extrapolation of these findings to losing participants
suggests that higher aggression would have been demonstrated had they been afforded the opportunity to respond during a losing round. Videogame aggressiveness was shown to be a valid measure of social aggression. Finally, Mortal Kombat participants were shown to have competitive and cooperative schemas consistent with a general sample of adolescents (with the exception that the Mortal Kombat group tended to perceive cooperative situations as more aggressive than the general sample).

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## Chapter 7

## Summary, Conclusions \& Recommendations

### 7.1 Summary

The current investigation was based on the 'working hypothesis' that competition leads to or causes aggressive behaviour. There were two broad methods employed to assess the empirical validity of the competition-aggression link, viz, a literature review and a series of experimental studies. The literature review was used as a process for guiding the methodological nature of the experimental studies.

The first task of this thesis was to gather and analyse psychological literature that has taken a largely experimental approach to the competition-aggression link. A standardised process was formulated for searching and collecting relevant literature (particularly from peer-reviewed journals), and a set of scientific criteria, of both a methodological and statistical type, were outlined for guiding the analysis of each study on the putative phenomenon. A total of 41 quantitative studies were found on the topic and were then subsequently analysed using these criteria. Most of these studies were laboratory based, but a few studies were ecological-type investigations. A large proportion of the laboratory-based studies utilised Taylor's procedure that entails a subject competing against a bogus opponent
on a reaction time task in order to avoid the administration of 'definitely unpleasant' electric shock.

Based on the literature review, a set of summary statements were proposed about the empirical nature of the competition-aggression link. These were:

1. There is a paucity of convincing research on the competition-aggression link. A consistent methodological shortcoming has been the failure to validate the outcome measure of aggression;
2. Most studies (outside of Taylor's reaction time procedure) show that competitive situations induce verbal and physical aggression amongst participants, as well as hostility (relative to less competitive or cooperative situations);
3. There have been no studies on participants' angry feelings;
4. The competition-aggression link has been demonstrated on children and adults. There is only one reported study on adolescents;
5. The link has been shown using males and females, although females have been underresearched;
6. There are no reported studies from the Australian context;
7. Competition induces aggression in winners and losers, although aggression is probably non-instrumental (i.e., intended solely to inflict harm on the recipient) for the latter group. Moreover, losers tend to demonstrate more aggression when in a laboratory-based situation;
8. Studies examining personality differences show that individuals with high-trait aggression are more likely to behave aggressively during competition. Taylor's reaction time procedure has revealed that a number of personality factors influence competitive aggression;
9. There are a number of situational factors that increase competitive aggression e.g., audience presence, audience pressure, increasing (or maximum) provocation from the
opponent, task failure, rewards (particularly for acting aggressively), behavioural compliance, and a male opponent; and
10. Aggression or hostility persists beyond the competitive situation, although the effect is probably setting bound.

Following from these summary statements, a number of aims were outlined for the experimental component of this thesis. Firstly, to demonstrate the competition-aggression link using a sound methodological approach; secondly, to conduct this research on an underresearched age group, viz, adolescents; and, thirdly, to contribute to theoretical ideas on competitive aggression.

The second task of this thesis was to conduct quantitative research on the idea that competition leads to or causes aggressive behaviour in adolescents. The method used in Anderson and Morrow's (1995) seminal experiments on university students, using a videogame task, was adopted as the primary approach for the current investigation. A videogame task was utilised for a number of methodological and ecological reasons.

Study 1 was the first of two studies that examined the idea that adolescents possess competitive and cooperative schemas that are disparate with respect to aggressive content. Male and female adolescents ( $\mathrm{n}=101$ ), aged between 12 and 16 , were requested to complete a survey comprising several sections. Survey items were on personal characteristics (e.g., age, sex), videogame playing experience, and perceptions of competitive and cooperative situations. Anderson and Morrow's (1995; Experiment 1) Common Features and Dimensional Ratings Questionnaires were utilised to evaluate participants' perceptions of competition and cooperation. The results revealed that participants rated competitive situations as significantly more forceful, aggressive, hurtful, destructive, and exciting, than cooperative situations, but rated competitive situations as equally pleasant as cooperative situations. Moreover, participants wrote significantly more aggressive words, and significantly fewer non-aggressive words, to describe competitive situations, than to describe cooperative situations. There were no significant gender or playing frequency differences
across these data. A major limitation of this study was the non-experimental nature of the data which render causal explanations inappropriate.

Study 2 was the first in a series of three studies that attempted to demonstrate the competition-aggression link using the basic methodology of Anderson and Morrow (1995; Experiment 2). Forty adolescents were randomly assigned to either a competitive or cooperative situation. Participants in the competitive situation were told that they were competing against their playing partner on Super Mario Brothers with the underlying objective of travelling as far as possible through the game. The cooperative participants, on the other hand, were told that they were playing together (within the same game) and were, once again, requested to travel as far as possible through the levels. Pairs from both groups played for a 20 -minute period and then completed a short questionnaire related to videogame perceptions. An analysis of videogame play revealed that the competitive group's mean kill ratio (.53) was not significantly different from the cooperative group's kill ratio (.52). That is, the competitive situation did not increase participants' videogame killing tendencies of encountered adversary relative to the cooperative situation. However, there was a significant counter-intuitive interaction effect between gender and experimental situation. Competitive females displayed a higher kill ratio than competitive males, but cooperative males demonstrated a higher kill ratio than cooperative females. These data imply that the competition-aggression link is applicable to adolescent females, but not to adolescent males, in the Australian context. A major shortcoming of this study was that competitive participants did not indicate a higher competitiveness level than cooperative participants (implying that the experimental instructions did not have the desired effect across the groups). The lack of efficacy in the experimental instructions was attributed to the utilisation of an outdated videogame. Study 3 was conducted using an identical methodological design to Study 2 with the exception that an intrinsically interesting videogame was utilised in Donkey Kong Country. Forty one participants were randomly assigned to either a competitive or cooperative situation. The procedure was identical to Study 2. A comparison of kill ratios revealed that, once again, competitive participants (.67) demonstrated an equal tendency to
kill encountered adversaries relative to cooperative participants (.67). These lack of group differences were found even though all participants indicated that Donkey Kong Country was interesting and enjoyable to play. The interaction effect between gender and cooperative/competitive groups reported in Study 2 was not observed in this study.

Study 4 was a repeated measures design that also utilised an intrinsically interesting videogame, viz, Diddy's Kong Quest. The purpose of this study was to account for possible baseline differences between the groups (e.g., game experience, personality and individual differences). However, like Studies 2 and 3, there was no significant observed differences between the competitive and cooperative groups across the baseline and experimental periods. No interaction effects were observed with gender. It was concluded, on the weight of this evidence, that either the competition-aggression link was not applicable to Australian adolescents or that the methodologies employed were not powerful enough to demonstrate the link for an adolescent population.

Study 5 was an extension of Study 1 in which the experienced Mortal Kombat players, who participated in Studies 6 to 8, were administered a survey measuring perceptions of competitive and cooperative situations. Comparisons were made between the Mortal Kombat group and the General sample of Study 1. Twenty two males completed the survey. A comparison of responses revealed that the Mortal Kombat group had comparable perceptions to the General sample with the exception that the former group rated cooperative situations as more aggressive than the latter group. Moreover, the General sample reported playing videogames on the personal computer for a significantly greater length of time than the Mortal Kombat group. The implication of these differences were discussed.

The next series of studies attempted to demonstrate the competition-aggression link using a methodological approach consistent with past research. Self-selected samples of experienced Mortal Kombat players acted as participants for these studies. Study 6 entailed a sample of experienced Mortal Kombat players ( $\mathrm{n}=16$ ) competing in a high competitive situation (a tournament for prizes) and a low competitive situation (i.e., a trial period). An analysis of participants' kill ratios (i.e., the proportion of times they chose to kill the
opponents' game character after winning), across the trial period and the toumament situation, revealed a significant increase in aggression. That is, participants were more likely to kill the opponent's game character during the tournament situation. A shortcoming of this study was the low number of participants who produced responses across the situations $(\mathrm{n}=10)$ and the low number frequencies for some participants. Study 7 was a systematic replication of Study 6. The same methodology was used except that male participants were not competing for prizes (i.e., gift vouchers, trophies) during the tournament. An analysis of these data revealed no significant differences between the trial period and tournament situation suggesting that a salient reward is an important factor in demonstrating competitive aggression.

Study 8 was conducted for a number of reasons. Firstly, a larger sample size ( $\mathrm{n}=21$ ) was utilised thus increasing the reliability of the collected data. Secondly, a non-tournament situation was incorporated into the design in order to evaluate the generalisability of the effect to a less ecological setting e.g., absence of an audience. An examination of the kill ratios showed that 16 of the 21 participants demonstrated a higher kill ratio during the experimental period than the baseline measure (only three participants showed a lower kill ratio), and there was a significant difference between the baseline and experimental periods. That is, participants demonstrated an increase in the tendency to kill the opponent's game character during the experimental period. Self-reports of state-anger, and positive and negative affect, prior to the baseline period, prior to the experimental period, and after the study, were recorded by participants. There was no significant increase in state anger or negative affect, or decrease in positive affect, by participants, although feeling states were correlated with game outcome. Winning participants reported significantly higher levels of positive affect at the conclusion of the study, and lower levels of negative affect and state anger, relative to losing participants.

The final study was a validation exercise of the Mortal Kombat 'kill ratio' construct which was assumed in the previous studies to be an aggressive behaviour. This study was driven by a frequent criticism in the aggression field that many reported studies have utilised nonvalidated and dubious measures of aggression. The Mortal Kombat kill ratio was assessed for
concurrent validity. Two approaches were taken to assess this validity. Firstly, teacher ratings were collected based on participants' non-instrumental aggressive behaviours towards peers and teachers. Secondly, participants' self-reports were collected of aggressive behaviour based on the Children Assertive Behaviour Scale (CABS). Participants' kill ratios were drawn from the baseline data of Study 8. These kill ratios were then correlated with teacher ratings and self-reports. The results revealed significant positive correlations between kill ratios and teacher ratings (both peers and teachers), and no significant correlations with self-reports. The kill ratio was also evaluated on 'perceptual validity' i.e., the extent to which participants perceived the videogame as violent. Participants rated each playing move from Mortal Kombat on a 7-point scale. Participants rated the killing moves of the kill ratio as the most violent, whilst they rated the non-killing moves of the kill ratio as the least violent. It was concluded that the Mortal Kombat kill ratio is a valid measure of aggressive behaviour insofar that it has both perceptual validity and concurrent validity.

### 7.2 Conclusions

Based on the findings presented thus far, a number of conclusions are reached with respect to competitive aggression. They are:

1. Adolescents and adults perceive competitive situations as aggressive, and perceive cooperative situations as less aggressive. There are no differences between males and females, and videogame playing frequency groups with respect to the competition and cooperation schemas. Experienced Mortal Kombat players perceive cooperative situations as more aggressive than the general adolescent population.
2. Adults, male adolescents, and children, behave more aggressively during competitive situations, relative to cooperative situations, and behave more aggressively when a
competitive situation becomes increasingly competitive (by, say, the presence of a reward). There are a number of personality factors that pre-dispose some individuals to display more competitive aggression than other individuals.
3. Competitive aggression is 'affectless' amongst experienced videogame playing adolescent males and 'affectless' amongst less experienced videogame playing university students (male and female). ${ }^{1}$ That is, competitive aggression is driven by a cognitive pathway. It is emphasised that this conclusion is highly tentative and better conducted studies are required to make conclusive statements about the underlying effect of competitive aggression.

### 7.3 Recommendations

### 7.3.1 General Recommendations

Based on the conclusion that competition is linked to aggressive behaviour, there is a strong temptation to entertain a number of potential strategies for reducing the occurrence of competitive aggression. ${ }^{2}$ However, there are a number of assumptions underlying this approach that are not necessarily supported by systematic evidence. Recall that this investigation has shown that people perceive competitive situations as aggressive implying an underlying schema, knowledge structure, or associative network. It has also been revealed that people tend to behave aggressively when placed in a competitive situation (usually an experimental setting). The sum of these points suggest that there are underlying cognitive mechanisms that 'cause' people to behave aggressively when placed in a competitive

[^31]situation. ${ }^{3}$ However, at no time have I estimated the prevalence of aggressive behaviour during competition in the 'real world', nor have I evaluated the association between competitive aggression and other types of aggressive behaviours, or whether competitive aggression in the 'real world' is necessarily anti-social. Moreover, I have not yet stated or studied the issue of where these competitive and cooperative schemas are learned, reinforced, and maintained. Based on this argument, it is recommended that:

General Recommendation \#1: A large national study examine the prevalence of competitive aggression across a number of settings (e.g., school, sports, and videogames) for different age groups (particularly children and adolescents).

If competitive aggression is prevalent enough to warrant concern, there is merit in formulating strategies for minimising competitive aggression.

It is emphasised that there are two broad approaches for reducing competitive aggression. These are: Prevention and Intervention. These approaches are discussed below. It is highlighted that these broad approaches significantly simplify the complexity of the issue since competitive aggression, as a phenomenon, probably varies across different contexts (e.g., sport, videogames, school) which lead to different solutions for prevention and intervention programs. In the following section, I will apply the broad methods suggested here within one specific domain, viz, videogames. It is emphasised that addressing the issue of competitive aggression will entail a new set of strategies for domains such as schooling and sports. ${ }^{4}$

[^32]Prevention implies an attempt to reduce the likelihood of a problem behaviour developing, in this case competitive aggression. ${ }^{5}$ Whilst there is strong evidence on the development of aggression, viz, during a critical socialisation period before 10 years of age (Homel, 1999; Parke \& Slaby, 1983), there is no evidence on when competitive aggression is formed (or, more specifically, when competitive aggression is formed across different settings). Thus, provided that competitive aggression is prevalent in the competitive settings mentioned above, it is recommended that:

General Recommendation \#2 (conditional): A longitudinal or cohort study (with a focus on children and adolescents) examine the developmental nature of the competition and cooperation schemas in order to ascertain the developmental pathways of competitive aggression i.e., when, where, and how, competitive aggression is learned, reinforced, and maintained.

Once it has been ascertained that 1 . Competitive-aggression is prevalent across a number of settings, and 2. The competition-aggression schema is formed, say, early in life (i.e., <10 years of age), one can begin to postulate prevention strategies that could be feasibly implemented in order to minimise anti-social competitive aggression. There are essentially three types of prevention strategies for minimising competitive aggression:

1. Teaching children that competition does not always equal aggression (Anderson \& Morrow, 1995). This strategy would entail shaping the competitive knowledge structure at an early age so it contains fewer aggressive elements. It is envisaged that when the recipient of the prevention strategy is confronted with a competitive situation it is

[^33]infrequently interpreted as aggressive. Anderson and Morrow contend that: "We are less optimistic about the efficacy of this approach" (p. 1029);
2. Teaching children to apply the cooperative schema when confronted with an ambiguous situation (Anderson \& Morrow, 1995; Deutsch, 1993). This strategy entails an active endeavour by the recipient to choose a cooperative coping strategy when there is an alternative to interpret an ambiguous situation as either cooperative or competitive. Deutsch (1993) provides a detailed thesis on this approach; and
3. Teaching children a range of behavioural strategies (aggressive, less aggressive, and nonaggressive behaviours) for competition (Deutsch, 1993). This strategy operates at a behavioural option level. That is, a situation is interpreted as competitive and aggressive, but the individual is taught a range of non-aggressive behaviours that have equal or greater efficacy under the circumstances.

Having outlined these three specific strategies, the task of future prevention programs should entail the process of evaluating the most effective practices for achieving a reduction in competitive aggression. For example, what are the most effective educational practices in teaching children to apply a cooperative schema to an ambiguous situation? A systematic analysis of these practices for each strategy is required in order to ascertain their relative costs and benefits.

It is emphasised that prevention strategies are an ideal that infrequently has a maximum effect on targeted behaviours. There is the inevitable fact that prevention strategies take literally years before they show an effect, and that some people are beyond the critical period at which the prevention strategy is being implemented and most effective. Intervention strategies are implemented on older age groups (i.e., adolescence, adulthood) who have already learned that competition is equal to aggression (i.e., the schemas are formed and difficult to change). There are two intervention strategies for these groups:

1. The recipient is taught that there are alternative behaviours to aggression e.g., cognitivebehavioural management of competitive-aggression. (NOTE: This intervention is likened to the third prevention strategy.); and
2. An environmental manipulation in which the competitive setting is altered to reduce the incidence of aggression. Research suggests that an obvious intervention strategy is the exclusion of rewards from competitive situations, although, in some contexts (e.g., sport) rule changes that penalise unacceptable aggression constitute another way of circumventing the link. ${ }^{6}$

It is stressed, however, that the current discussion of Prevention and Intervention strategies provides a simplistic view of the logistics. There is a systematic process by which a set of strategies are formulated, implemented, and sustained. Evidence from the health field (e.g., health promotion) reveals that strategies to reduce health-related diseases, and risk-taking and problem-related behaviours, constitute a complex process. The traditional view implied that the dissemination of an intervention was a sufficient strategy to maximise health outcomes, however, current practice shows that prevention/intervention programs are most effective when they are based on scientific evidence (e.g., evidence-based practice), formulated through consultation with affected parties (i.e., those who will implement the program), supported by infrastructure (e.g., resources, workplace and institutional policies), and entail provisions for the program to be sustained. Deutsch (1993) has provided an account of these issues within the educational context.

To apply these points to the education setting, a prevention program that sets out to educate primary school children on cooperative behaviours would require: A systematic review of scientific evidence on what types of strategies are effective (i.e., what should be

[^34]taught, when, and by whom); consultation with key informants (e.g., teachers, principals, school counsellors, students, and parents) on what they believe is a plausible prevention program derived from the systematic review; the implementation of the program i.e., educating teachers on the types of learning strategies they should deliver to students; adequate and appropriate infrastructure e.g., curricula changes that incorporate the implemented strategies, workplace support (i.e., each school supporting the implementation of the program by their teachers), institutional support (i.e., school departmental bodies endorsing the curricula changes), and resources (e.g., finances to implement the program); and a continual evaluation of the program's effectiveness in order to update the program.

### 7.3.2 Specific domain: Videogames

During 1993, the release of Mortal Kombat (a graphically violent arcade game) created a public debate over the negative effects of videogames on Australia's youth (Donovan, 1993; Scott, 1995; Yelland, 1995). Lobbying from community action groups led to a meeting in Darwin where the State Attorneys-General supported the development and implementation of a classification system for videogames (Raethel, 1994). Within a year, a classification system was devised, and the system now operates in each State.

The impetus of the classification system was based on the assumption that videogames have negative effects on players, particularly children and adolescents. However, researchers, lobbyists, and other commentators, have largely disagreed on the extent to which this assumption is valid (Ask, 1996b, 1996c; Biggins, 1995; Dill \& Dill, 1998; Durkin, 1995a; Durkin \& Low, 1998; Ellis, 1998; Mitchell \& Taylor, 1998). For example, Durkin (1995a) conducted a literature review, commissioned by the Australian Office of Film and Literature Classification, and concluded that:

Although the research is not exhaustive and by no means conclusive, it indicates that the stronger negative claims are not supported. Computer games have not led to the development of a generation of isolated, antisocial, compulsive computer users with strong propensities for aggression. (Durkin, 1995a, p. 71)

In contrast, Biggins (1995) concluded from an analysis of the same literature that: "we have no proof of no harm from videogames, and we have some proof of harm" (p. 85). Dill and Dill (1998) have also reviewed the same literature. One writer has even speculated that the Columbine school massacre resulted from one killer's predilection for a violent videogame called Doom (Taylor, 1999).

Placing these hypotheses and conclusions aside for the moment, commentators and researchers have consistently suggested that further research is required on violent videogames to reach accurate conclusions about the likely effects of this popular media (Ask, 1996b, 1996c; Durkin, 1995a; Ellis, 1998; Mitchell \& Taylor, 1998). There is a temptation then to argue that this thesis provides evidence for the negative claims made about violent videogames. However, one must proceed with caution. It has not been shown that videogames make an adolescent more aggressive during or after a playing session i.e., shortterm behavioural effect. Neither has it been shown that repeated practice on videogames results in constitutional changes in the player i.e., increased propensity for aggression across a number of settings. What has been demonstrated is that playing a violent videogame under a competitive situation results in aggressive videogame play (particularly when players are competing for rewards). These findings have much broader implications than concluding that violent videogames have a negative effect on the game player. If we assume that videogames with competitive-violent themes (e.g., Tekken, Mortal Kombat, Street Fighter) reinforce the notion that competition is equal to aggression, then the continual interaction with this media may have negative effects on the player e.g., tendencies towards aggression in other competitive situations. However, this is a conjecture for future research. This leads to the first recommendation:

Specific Recommendation \#1 (conditional): A study should examine whether repeated exposure to videogames with competitive-violent themes lead to changes in the competitionaggression schema and/or alter the player's propensity towards aggressive behaviour across a diverse range of competitive settings.

However, there are a number of unverified assumptions surrounding the recommendation for research on this issue. A research program that examines the cognitive-behavioural effects of videogames presupposes that, firstly, there is a 'reasonable' proportion of videogames on the Australian market that have competitive-violent themes, and that, secondly, they are 'popular' (i.e., have wide exposure). One could argue that it is a superfluous task to follow the first recommendation if there are very few videogames that are 'popular' on the market with competitive-violent themes. Thus, this leads us to the second recommendation:

Specific Recommendation \#2: A content analysis of videogames be conducted in order to ascertain the proportion of videogames on the Australian market that have competitive-violent themes and the extent to which these videogames are 'popular'?

Whilst there is no evidence based on the first recommendation, there is certainly preliminary information on the second recommendation that may prove beneficial in guiding research of this kind. A lengthy extract from Mitchell and Taylor (1998) provides basic information on this issue (albeit on violent themes only):

If you look at any games magazine $\ldots$, you will quickly come to realise that most of the games covered are violent. It sometimes seems that all new games include some
aspect of violence. As Michael Van Ray of games distributor Metro Playcorp said, "Violence is certainly in almost any game we sell."

Certainly, if you take a liberal view of what constitutes violence, even family games such as Muppet Treasure Island contain violence, albeit cartoonish and unrealistic. Yelland said, "The vast majority of games seem to have this common theme of destroying things. The idea is that you shoot, bash or eliminate everything in sight."

Far more disturbing than this apparent acceptance of violence in all types of games, however, is the development of ever more gory games. Since the release of the incredibly popular Doom, many developers have been in an apparent race to produce the most gore in a single game, believing that that is what the gameplaying public wants.

According to the OFLC's Jennifer Rae, warnings about violence are the most common warning on the front of computer game boxes. Unfortunately, Rae could not provide information on the number of games which had been rated with violence warnings. She did say, though, that the majority of games rated by the OFLC were classified $G$ and $G(8+)$, which would indicate excessive violence is not present in the majority of games. It should be noted that games with low-level violence can be rated G (8+), and the OFLC seemingly considers some types of violence acceptable.

Even if the majority of games are non-violent, it would seem that it is the violent ones which are heavily promoted (see Australian Personal Computer, December, page 28) and consequently sell more. Last year's biggest selling games were mostly war games such as Command and Conquer and first person 3D shooters such as Quake. (p. 80)

[^35]This quote suggests that most videogames are not violent on the Australian market, but that the most popular videogames are violent. What is not evident from this quote is information on competitive-violent videogames. Moreover, Mitchell and Taylor (1998) have raised a critical distinction between violence per se and the graphic representation of that violence. Thus, an endeavour to tackle the second recommendation should take into consideration the 'realism' of videogames as well as their competitive-violent content.

Ask (1996a) conducted an unpublished content analysis of violent videogames. His paper will be covered in some detail here because it may provide pertinent information in fulfilling the second recommendation. It is noted that Bobko, Bobko, and Davis (1984) have also conducted a content analysis of videogames using a multi-dimensional scaling procedure. However, their content analysis is based on very outdated videogames and will not be considered in this chapter.

Given the lack of research in the videogames field, Ask (1996a) based his methodological ideas on research from violent television because there have been a number of different content analyses conducted since the inception of film and television (e.g., Cumberbatch, Lee, Hardy, \& Jones, 1987; Gerbner, 1972; McCann \& Sheehan, 1985). Debate over the analysis of violent television has focussed on the contextual basis of aggressive acts with several commentators arguing that not all aggression are equal (Coffin \& Tuchman, 1972; Kunkel, Wilson, Donnerstein, Linz, Smith, Gray, Blumenthal, \& Potter, 1995; Lometti, 1995). A factor associated with 'context', that has proven to be of scientific validity, is the 'realism' of portrayed violence. The realism of a program has been found to influence a viewer's perceptions of violence, and elicit different emotional and behavioural responses. For example, Berkowitz and Alioto (1973) showed that male university students displayed more 'angry aggression' after watching a war movie, that was said to be 'real', relative to subjects who were told that the same movie was fictional. Feshbach (1972) observed similar group differences when children were exposed to a riot that was said to be either a 'real' event or a Hollywood movie. Moreover, Noble (1973) showed that children were more aggressive during play if they had watched realistic violence in contrast to stylistic violence.

Following from this research, Ask devised a content analytic schedule that contains two dimensions, viz, 'violence' and 'lifelikeness'. The violence dimension contains five items (e.g., "How much blood and gore is shown?") that measures the degree of violence in a videogame, whilst the lifelikeness dimension contains 10 items (e.g., "Is the game 1-, 2-, or 3dimensional?") that measure the degree of realism i.e., the context in which the aggression is performed. It should be noted that these items were based on a reductionistic approach (i.e., separating elements in a videogame such as graphics, sound, and setting) because there is a lack of experimental work in the videogames field that could be utilised to formulate appropriate items. In time, however, these items may be supported by empirical evidence and thus be appropriate inclusions in the coding schedule. For example, Ballard and Wiest's (1996) study showed that the depiction of blood and gore tends to elicit greater hostile feelings when playing Mortal Kombat which implies that the item of "How much blood and gore is shown?" is a perfectly valid inclusion in the schedule.

Ask subsequently utilised a rigorous procedure to collect and analyse a sample of videogames. Firstly, only Super Nintendo videogames were analysed ( $n=33$ ). Secondly, Super Nintendo games were collected on the basis of their relative 'popularity' amongst game players with sampling occurring across a range of different types of games (e.g., Platform, Simulation, \& Adventure games). Thirdly, games were played using a standardised procedure (e.g., in the one-player mode on a normal difficulty level).

Results from the content analysis showed that 24 of the 33 videogames (73\%) had a violent theme (based on a pre-determined definition). Of those 24 violent videogames, there was an average of 650 violent acts in each one with a minimum of 50 ('Another World') and a maximum of nearly 3,000 ('Aliens 3 '). An analysis of each dimension showed that the average videogame of the entire sample scored 9.1 ( $\mathrm{SD}=3.3$ ) on the lifelikeness scale, whilst the average score was 7.2 (4.8) on the violence scale (given a maximum possible score of 17 and 15 for each respective scale). That is, the average videogame was above the mid-point on the lifelikeness dimension, but below the mid-point on the violence dimension. The average violent game scored 8.8 ( $\mathrm{SD}=3.1$ ) on the lifelikeness dimension and 9.9 ( $\mathrm{SD}=2.0$ ) on the
violence dimension. When all videogames were placed into a two-dimensional diagram, there was an even spread of these Super Nintendo games across the space.

A major strength of Ask's content analysis is the differentiation of videogames along more than just a violence dimension. One barrier of this content analysis was the difficulty in defining a 'competitive-violent' videogame. Whilst some videogames had an obvious theme associated with competition, others were more difficult to categorise and may have been defined as competitive-violent if a broad definition was employed. Future research should carefully consider definitions of 'violence' and 'competition' when conducting a content analysis that evaluates the proportion of 'popular' videogames that have competitive-violent themes. The limited number of videogames analysed by Ask $(\mathrm{n}=33)$ on a relatively old system (e.g., Super Nintendo) warrants a larger investigation on newer systems such as the Playstation and Nintendo 64. Moreover, as mentioned above, the items from Ask's coding schedule were devised by separating elements in a videogame that are consistent across most videogames. However, future research on the perceptual and cognitive-behavioural effects of these elements (e.g., graphics, sound) should drive the inclusion of items within a content analytic schedule rather than employing the preliminary approach used by Ask.

If future research shows that competitive-violent videogames are prevalent and popular, and have negative effects on the game player, then a further recommendation is:

Specific Recommendation \#3 (conditional): Game developers should be encouraged to program videogames which separate competition from aggression and/or classifiers (e.g., OFLC or Chief Censor for Videogames) assess the current classification system for videogames with the potential objective of re-formulating it so that videogames with competitive-violent themes are assigned a stricter classification than presently enforced.

### 7.4 Tyson's Ear Bite Revisited

Mike Tyson's infamous ear bite during a heavyweight title fight left many boxing aficionados scratching their heads over an adequate explanation of this incident. Even Tyson was short of an explanation for his behaviour. However, science has already progressed towards a preliminary understanding of competitive aggression, including Tyson's ear biting incident. In light of the posed question - "To kill or not to kill" - the current investigation has shown that humans will choose the former type of action in a simulated competitive situation.

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## Appendix A

## Materials for Study 1

## The Competition and Cooperation Survey

The following survey is about competition and cooperation. People are faced with competitive and cooperative situations during everyday life.

Competition is when you compete against another person or team and there is generally only one winning person or side. A sports match is a competitive situation.

Cooperation is when you cooperate with another person or team. Cooperation involves people working together to achieve a common goal such as building a house or baking a cake.

This survey starts after this page. It is divided into four parts.
The first page is a general information sheet which asks for your age, sex, and year level.
The second page has questions about the amount of videogames you play each week, and the amount of television and films you watch.

The next two sections are about competition and cooperation. The first section is composed of two pages. For the first page, you must think of cooperative situations you have been in during the past and list at least three but no more than ten words that describe being in that situation. For the second page, you must do the same but now you must think of competitive situations.

The next section has six scales repeated over two pages. You must mark a number for each scale. The first page is about cooperation and the second page is about competition.

Please answer each question as accurately as possible. Don't rush your responses: Take your time. Can you not discuss your answers with other students when you are completing the survey. Don't hesitate to ask me about any queries or concems you might have about this document. You don't have to complete questions if you don't feel like it. You are allowed to withdraw from completing this survey at any stage.

## Part A. General Information

1. Name:
2. Age:
3. Sex:
4. Year Level:
5. Which hand do you write with (i.e., right or left hand):

## Part B. Questions About Television and Videogames

6. Do you live in a house where there is a personal computer (eg. an IBM, Atari or Apple Computer)?

| Yes | No |
| :---: | :---: |
|  | Go to Question 9 |

7. In an average week, how many times would you sit down and play videogames on the computer? Sessions $\qquad$
8. On average, how long does a session last? Minutes $\qquad$
9. Do you live in a house where there is a videogame system?

| Yes | No |
| :---: | :---: |
|  | Go to Question 12 |

10. In an average week, how many times would you sit down and play videogames on the games system? Sessions $\qquad$
11. On average, how long does a session last? Minutes $\qquad$
12. Do you play videogames in arcade parlours and public places, like corner shops or shopping malls?

| Yes | No |
| :---: | :---: |
|  | Go to Question 15 |

13. In an average month, how many times would you go to the arcade parlour and play videogames? Sessions $\qquad$
14. On average, how long would you spend playing videogames each time you go? Minutes $\qquad$
15. Do you go to your friend's house to play videogames?

| Yes | No |
| :---: | :---: |
|  | Go to Question 18 |

16. In an average week, how many times would you go to your friend's house to play videogames? Sessions $\qquad$
17. On average, how long does a session last? Minutes
18. How much television do you watch every day? Hours $\qquad$ Minutes $\qquad$
19. How many times do you go the cinema each month? Times $\qquad$
20. How many videos do you watch each week? Number $\qquad$

## Part C. Common Features Questionnaire

## Part 1

People are frequently involved in cooperation. Cooperation is when people cooperate with one another. I am interested in the way you think of cooperation. Can you take a few moments to think of a time in the past when you have been in a cooperative situation?

Can you list at least 3 words that best describe cooperation? Do not list more than 10 words.

1. $\qquad$
2. $\qquad$
3. $\qquad$
4. $\qquad$
5. $\qquad$
6. $\qquad$
7. $\qquad$
8. $\qquad$
9. $\qquad$
10. $\qquad$

## Part 2

People are frequently involved in competition. Competition means when people are competing with one another. I am interested in the way you think of competition. Can you take a few moments to think of a time in the past when you have been in a competitive situation?

Can you list at least 3 words that best describe competition? Do not list more than 10 words.

1. $\qquad$
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. $\qquad$
10. $\qquad$

## Part D. Rating Dimensions

Part 1

Can you rate cooperation along the following 6 dimensions?

1. How forceful is cooperation?

2. How aggressive is cooperation?

| 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: |
| Not at all | Moderately | Extremely |  |  |

3. How hurtful is cooperation?

| 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: |
| Not at all | Moderately | Extremely |  |  |

4. How destructive is cooperation?

5. How exciting is cooperation?

6. How pleasant is cooperation?

| 1 | 2 | 3 | 4 |
| :---: | :---: | :---: | :---: |
| Neither <br> unpleasant nor <br> pleasant | 5 |  |  |
| Unpleasant |  | Very pleasant |  |

Part 1

Can you rate competition along the following 6 scales?

1. How forceful is competition?

| 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: |
| Not at all | Moderately | Extremely |  |  |

2. How aggressive is competition?

| 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: |
| Not at all | Moderately |  | Extremely |  |

3. How hurtful is competition?

| 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: |
| Not at all | Moderately | Extremely |  |  |

4. How destructive is competition?

5. How exciting is competition?

| 1 | 2 | 3 | 4 | 5 |
| :--- | :--- | :--- | :--- | :--- |
| Very dull | Neither dull <br> nor exciting |  | Very exciting |  |

6. How pleasant is competition?

| 1 | 2 | 3 | 4 |
| :---: | :---: | :---: | :---: |
| Neither <br> unpleasant nor <br> pleasant | 5 |  |  |
| Unpleasant |  |  |  |
|  |  |  |  |

## Appendix B

Materials for Studies 2, 3 \& 4

## Instructions for Study 3

1. You must not talk to each other at all.
2. You are going to play Donkey Kong Country.
3. The object of this game is to collect bananas and lives, and get through the levels.
4. You start as Donkey Kong and collect Diddy in the first barrel.
5. You pick-up barrels by pressing the GREEN button and throw it by releasing the button.
6. You can swap apes by pressing the SELECT button.
7. YELLOW makes you jump.
8. Pressing GREEN and YELLOW together makes you jump higher.
9. GREEN makes you run when you press it along with the direction pad.
10. You can kill things two ways. Firstly, by jumping on the enemys' head. Secondly, by throwing a barrel at them.
11. You can avoid things two ways. Firstly, by jumping over the enemy. Secondly, by running underneath them.
12. You can also throw an ape by putting it on your head by pressing the RED button and throwing it by pressing the GREEN button.
13. I am now going to give you five minutes practice.

## 1. Competitive Instruction

1. You are playing against each other.
2. It is a competition to see who can go further through the levels.
3. You will have 20 minutes to play.
4. Player 1 will start first and when he or she dies or finishes a level it is automatically Player 2's turn. It alternates like this all the time.
5. Can you please remember not to talk.
6. Can you read these rules.

## 2. Cooperative Instruction

1. You are playing with each other.
2. You are playing the same game and must help one another. Go through as many levels as possible.
3. You will have 20 minutes to play.
4. Player 1 will be Donkey Kong and Player 2 will be Diddy Kong. After 10 minutes you will swap control pads and Player 1 will become Diddy and Player 2 will become Donkey Kong.
5. When a player dies or completes a level, it is automatically the next players turn.
6. Use the swap mode as much as possible. That is, share turns as much as possible.
7. Can you please remember not to talk.
8. Can you read these rules.

# Questionnaire for Study 3 <br> (Donkey Kong Country) 

Anonymity Number $\qquad$

This questionnaire has a series of questions about the videogame you have just played. For each question please circle the appropriate number. For example:

## 3. How difficult was Super Mario Karts?

| Very Easy | Moderately <br> Difficult |  |  |  | Very Difficult |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2 | 3 | 4 | 5 |  |  |  |  |

DO NOT CIRCLE MORE THAN ONE BOX. Should you make a mistake write 'error' over the wrong answer. Please answer each question as accurately as possible. Do not rush your responses: Take your time. Refrain from discussing you answers with your playing partner when you are completing the survey. Please don't hesitate to ask me about any queries you might have about this document. You don't have to complete questions if you don't feel like it. You are allowed to withdraw from completing this questionnaire at any stage.

1. How much did you enjoy playing this videogame?

Did not enjoy it
Enjoyed it
Enjoyed it a lot

| Enjoyed it a lot |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. How well did you think you played?

| Poorly |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 2 | 3 | 4 | 5 | Really Well |

3. How easy was it to play?

| Very Easy |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 |  | Reasonably Hard |  |  |
| 1 | 2 | 4 | 5 | 6 | Very Hard |

4. How frustrating was it?

| Not Frustrating | Slightly Frustrating |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |  |

5. How violent was it?

| Moderately Violent |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not Violent | Extremely <br> Violent |  |  |  |  |  |  |  |  |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |

6. How realistic was the videogame?

| Unreal |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 2 | 3 | Moderately Real |

7. How interesting was it?

| Boring | Interesting |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |  |

8. Once you had finished playing did you want to continue?

| No | Maybe | Definitely |
| :---: | :---: | :---: |
| 1 | 2 | 3 |

9. How hard did you try?

| Did not try |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 2 | 3 | 4 | 5 | 6 | Tried Har |

10. How much did you compete with the other person?

| Did not <br> compete | 2 |  |  |  | Competed |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 |  |  |  |  |  |

11. Have you ever played this videogame before?

| No | Yes |
| :---: | :---: |
| 1 | 2 |

12. If you answered 'Yes' to the last question how many hours did you spend playing this videogame before this study? Hrs \& Mins $\qquad$
13. Did you participate in any sport within an hour before this experiment began?

| No | Yes |
| :---: | :---: |
| 1 | 2 |

14. What were the aims of this study?

## Appendix C

Materials for Studies 5, 6, 7, 8, \& 9

## General Survey for UMK3

The following survey has two sections.
The primary aim of this survey is to examine your perceptions of UMK3 with respect to violence. There are a list of playing moves from the videogame such as a 'low kick', 'babality', and 'block'. Can you rate each of these moves on a 7-point scale. Please answer each move by circling a number.

The second aim of this survey is to examine your assertiveness towards other people. There is a list of 12 items in this scale. Please read each statement carefully, and then select an answer, by circling it, that is most typical of the way you would (or have) responded in this type of situation. There are no right or wrong answers to these questions.

Please answer each question as accurately as possible. Don't rush your answers. Take your time. Refrain from discussing you answers with other students when you are completing the survey. Please do not hesitate to ask me about anything in this survey. You don't have to complete questions if you don't feel like it. You are allowed to withdraw from completing this survey at any stage.

## Rating UMK3

Can you rate these general questions by circling a number?

1. How violent do you think is UMK3?

| Not violent | Moderately violent |  |  |  |  | Extremely violent |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 |  |

2. How real do you think is UMK3?

| Not real | Moderately real |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 |  |  | Extremely real |  |  |

Can you rate the violence level of these moves from UMK3?
3. Low kick:

| Moderately violent |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not violent | Extremely <br> violent |  |  |  |  |  |  |  |  |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |

4. Block

Not violent Moderately violent Extremely

| 1 | 2 | 3 | 4 | 5 | 6 | violent |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |

## 5. High kick:

| Mot violent |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Norately violent |  | Extremely <br> violent |  |  |  |  |  |
| 1 | 2 | 2 | 3 | 4 | 5 | 6 | 7 |

## 6. Low punch

| Moderately violent |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not violent |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | Extremely <br> violent |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |  |

7. Sweep

| Not violent | Moderately violent |  |  |  |  | Extreme violen |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 |  |

8. High punch

Not violent Moderately violent Extreme

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

## 9. Babality

| Not violent | Moderately violent |  |  |  |  | Extreme violen1 7 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 |  |

10. Fatality

| Not violent | Moderately violent |  |  |  |  | Extreme violent |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 |  |

11. Grab and throw

| Not violent | Moderately violent |  |  |  |  | Extreme violent |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 |  |

## 12. Animality

| Moderately violent |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not violent | Extreme <br> violent |  |  |  |  |  |  |  |  |  |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |  |

13. Friendship

| Not violent | Moderately violent |  |  |  |  | Extreme violent |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 |  |

14. A special move

| Moderately violent |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not violent |  |  |  |  |  |  |
| 1 | 2 | 3 | 4 | 5 |  | Extremely <br> violent |

15. A combo (ie. combinations)

| Moderately violent |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not violent | Extremely <br> violent |  |  |  |  |  |  |  |  |
| 1 | 2 | 2 | 3 | 4 | 5 |  |  |  |  |

16. Flying kick

| Moderately violent |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not violent |  |  |  |  |  |  |
| 1 | 2 | 2 | 3 | 4 | 5 |  |
| Extremely <br> violent |  |  |  |  |  |  |

## Questionnaire for the Ultimate MK3 Challenge

## FEELING SCHEDULE

This section is designed to measure how you feel right now. Rate each sentence below using the 5 -point scale. There are no right or wrong answers, so can you please rate your mood as accurately as possible. If you make a mistake, then cross the wrong answer out and write the new answer next to it.



[^0]:    Alex Ask
    Department of Psychology
    University of Adelaide
    Date: 31.12 .99

[^1]:    ${ }^{1}$ This model has been borrowed from Zinberg's conceptualisation of the effects of drugs (see Zinberg, 1984).

[^2]:    ${ }^{1}$ Game theorists call this a 'zero-sum game'.

[^3]:    ${ }^{2}$ This position does not contradict Bandura's argument that non-instrumental aggression can be reframed as an instrumental response. What is being said is that some aggressive responses are performed with the expectation that they will increase the likelihood of winning, whilst other aggressive responses are less realistic in terms of expected outcomes or may be devoid of a winning expectation.
    ${ }^{3}$ 'Harm' usually means the delivery of a noxious stimulus or stimuli.

[^4]:    ${ }^{4}$ A distinction must also be drawn between different types of unacceptable/illegitimate aggressive behaviours. For example, one type of distinction might be clinical/pathological aggression and nonpathological aggression. The researcher must also consider the contextual basis of these behaviours. For example, amphetamine users who undergo withdrawal management (i.e., 'cold-turkey') are prone to display aggressive behaviours. This clinically-based aggression is a transient psycho-physiological phenomenon, and should be contrasted with long-term clinical aggression.

[^5]:    ${ }^{5}$ See Vincent and Allsop (1996) for a definition of 'key informants' and a methodological approach to collecting key informant data.

[^6]:    ${ }^{6}$ It is emphasised at this point that when 'character' is written hereafter it should be interpreted as a videogame character (e.g., Pac-Man) and not as a personal attribute of the player i.e., moral and mental qualities of an individual.
    ${ }^{7}$ The killing response is probably not completely non-instrumental because one could argue that a player may choose to kill the vanquished game character as a means of intimidating the opponent for the next round. There is no evidence to make a conclusive statement either way, however, the response is definitely less instrumental than in 'platform' games.

[^7]:    ${ }^{1}$ It is noted that there are no qualitative studies directly aimed at investigating the competitionaggression link. However, Jones (1996) and Hughes (1988) have reported indirect studies. Jones' study was briefly discussed in Section 1.2. Hughes observed fourth- and fifth-grade children (mostly girls) in a school-yard game called FourSquare. She found that participants would be 'mean' to distant friends in order to be 'nice' towards close friends. These findings contradict the traditional notion that girls are merely cooperators: "We find little evidence that ... girls just sit around with one or two close friends exchanging intimacies, that they lack skills in organizing and sustaining large-group activities or games with highly complex and elaborated rule structure e.g., ... that they are incapable of competition, or that they fall apart in the face of conflict" (p.681).

[^8]:    ${ }^{2}$ Super Mario Brothers has been classified by the Australian Office of Film and Literature Classification in the ' $G$ ' or General Classification category implying that it "is suitable for the youngest child and should not require parental supervision" (OFLC, 1994, p. 6). That is, the videogame is perceptually non-violent.

[^9]:    ${ }^{3}$ Gustafson (1985) has argued that Taylor's paradigm for alcohol-related research assumes that pain thresholds remain stable across the experimental period for intoxicated subjects. However, Gustafson showed that intoxicated subjects chose higher initial levels as a criterion for 'definitely unpleasant' shock, relative to sober subjects, and tended to experience shock more intensely. These findings suggest that the utilisation of alcohol and other drugs within Taylor's procedure introduces an unwanted confound which is not present amongst a comparison group of non-intoxicated subjects i.e., the procedure may not provide internally valid results when subjects are intoxicated.

[^10]:    4 'Mundane realism' refers to the degree to which the experimental situation resembles the 'real world' situation (in this case, competition). See Carlsmith et al. (1976) for a more detailed definition of 'mundane realism'.

[^11]:    Given such a developmental history and the greater propensity to rely on external cues for delineation of appropriate social behavior, field-dependent persons may be more uncertain regarding what responses to attack are appropriate and thus less aggressive when attacked than field-independent persons. (p. 193)

[^12]:    ${ }^{5}$ It must be said that the broad point that aggressive behaviour has an adaptive function is a highly contentious statement. There was no empirical evidence cited as to what aggressive behaviours are considered adaptive, by whom, and in what society.

[^13]:    ${ }^{6}$ These studies are contrasted with research where the subject is rewarded for either reducing or increasing aggressive responding during competition (e.g., Dengerink, 1971).
    ${ }^{7}$ It is impossible to ascertain the validity of this point since the study was conducted nearly 30 years ago where $10 ¢$ may have been of great value to university subjects. It would have been interesting if the authors had two levels of money (say $10 ¢$ and $\$ 1$ ) in order to examine the relative effects of a higher versus lower reward.

[^14]:    ${ }^{8}$ One subject utilised the level-10 setting but was excluded from the analysis. The authors wrote at length (in the discussion) about this subject's behaviour and why they excluded him from the analysis.

[^15]:    ${ }^{9}$ The interpersonal communications task was developed by Hokanson et al. (1968). It has a short time lag between the subject's and opponent's responses thus providing a more reliable situation for examining the nature of these contingencies.

[^16]:    ${ }^{10}$ The apparatus is structured so that the white noise increases in intensity from 75 dB at onset to 100 dB at 10 seconds. That is, the noise gets louder as the delivery time increases.

[^17]:    " There was an early suggestion in the literature that aggression under Taylor's procedure is confounded by practice effects. Subjects are said to increase shock settings across trials because they are gaining confidence in their ability to win as they experience more trials, rather than increasing shock settings because they are reciprocating provocation. That is, higher shock settings across trials reflect an increased expectation of winning. Despite the plausibility of this hypothesis, Epstein and Taylor (1967) have tested this 'practice-effect hypothesis' and have found no data to support it.

[^18]:    ${ }^{12}$ The principal investigator (who also conducted observations throughout the study) took on the guise of a caretaker.

[^19]:    ${ }^{13}$ Aggressive penalties included fighting, spearing, butt-ending, high sticking, slashing, cross-checking, instigating, roughing, boarding, charging, kneeing, elbowing, and match penalties.

[^20]:    ${ }^{14}$ Note that one study did not specify the gender of participants (Deutsch, 1949b).

[^21]:    ${ }^{1}$ It is worth noting that the list of aggressive and non-aggressive words in this study were highly similar to those reported by Anderson and Morrow (1995).

[^22]:    ${ }^{2}$ The second rater scored 10 participant's kill ratio from each experimental group.

[^23]:    ${ }^{3}$ Competitive participants under Anderson and Morrow's methodology play different games alternately which suggests that the goal (of progressing as far as possible through the scenario) is derived from independent tasks. In contrast, cooperative participants play the same game and thus the goal of progressing through the scenario is largely interdependent because a participant's game play automatically influences the task of the second participant.

[^24]:    ${ }^{1}$ The OFLC further write about the MA classification: "Elements which might warrant this category would include: depictions of realistic violence of medium intensity (e.g., impactful punches, kicks, blows and blood-shed to realistic animated characters or real-life images)" (OFLC, 1994, p. 7).

[^25]:    ${ }^{2}$ Participants were not permitted to change their fighter during the study because a strategy amongst proficient players is to observe what fighter their opponent has chosen for a bout and then choose a fighter who is relatively stronger (in order to maximise the chances of winning). Forcing participants to adhere to their chosen fighter prevented unnecessary debate between competitors as to who would choose their fighter first before a match.

[^26]:    ${ }^{3}$ The experimental area for this study (and Studies 7 and 8 ) was the same as for the Chapter 5 studies. The reader is referred to Study 2 (Section 5.3.2) for a full description of the experimental room.

[^27]:    ${ }^{4}$ There have been studies from the general aggression field that have also tested the causal power of rewards on facilitating aggressive behaviour under non-competitive situations. Generally speaking, these studies have shown that rewards, such as money (Buss, 1963, 1966; Loew, 1967; Lovaas, 1961) or verbal praise (Geen \& Pigg, 1970; Geen \& Stonner, 1971), facilitate aggression e.g., electric shock during a teacher-learner paradigm. Interestingly, Simkins (1961) and others (e.g., Lovaas, 1961) have shown that rewards for one type of aggression increases the probability of other forms of aggressive behaviour.

[^28]:    ${ }^{5}$ Of course, there are examples where some of the world's best sportspersons have had hostile dispositions e.g., Tristan Nancarrow (squash) and John McEnroe (tennis).

[^29]:    ${ }^{6}$ It is noted that these 14 playing moves, listed in the questionnaire, exhaust all the generic playing moves in the Mortal Kombat 3 videogame.

[^30]:    ${ }^{7}$ See Section 2.4 for an explanation as to why the Mortal Kombat kill ratio represents noninstrumental aggression.
    ${ }^{8}$ The approach of allowing each teacher to rate participants on what they thought were 'inappropriate' aggressive behaviours was used because each teacher had taught for over 20 years. One teacher's wife was a school counsellor who was trained in problem behaviours amongst high school students.

[^31]:    'The use of the terms 'experience' and 'inexperience' pertain to videogame play, although they may also generalise to other competitive activities.
    ${ }^{2}$ I should emphasise here that we are trying to reduce competitive aggression which is illegitimate, unacceptable, or inappropriate.

[^32]:    ${ }^{3}$ This argument is based on Berkowitz and Donnerstein's (1983) thesis that laboratory studies denude underlying psychological mechanisms even though the experimental setting is highly contrived.
    ${ }^{4}$ The school and sport domains were not covered here because they are beyond the scope of this thesis and the expertise of the author. The reader is referred to Deutsch (1993) for an excellent case on the cooperative approach towards schooling.

[^33]:    ${ }^{5}$ Prevention in this context is equivalent to what is called 'primary prevention' in the medical field in which the aim is to reduce the likelihood of disease occurring (RACGP, 1998) or 'developmental prevention' in the social sciences which entails early intervention in developmental pathways that lead to anti-social behaviours (Homel, 1999).

[^34]:    ${ }^{6}$ Examples of recent changes in sports rules that constitute an environmental intervention are soccer (e.g., FIFA's 'Fair Play' policy that promotes greater skill at the expense of aggressive behaviours) and the Australian National Rugby League's current crackdown on head high tackles (to reduce sportsrelated neck injuries). More extreme forms of environmental manipulations include banning sports altogether (see the Australian National Health and Medical Research Council's recommendations on boxing at www.health.gov.au/nhmrc/publicat/si-home.htm).

[^35]:    ${ }^{7}$ It is stressed that this recommendation, whilst labelled \#2, actually precedes Recommendation \#1. That is, the content analysis should be conducted first and then the effects of these videogames should be explored.

