Computer Games

their effects on young people:

A REVIEW

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Sydney, NSW

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The Project

THE PROJECT

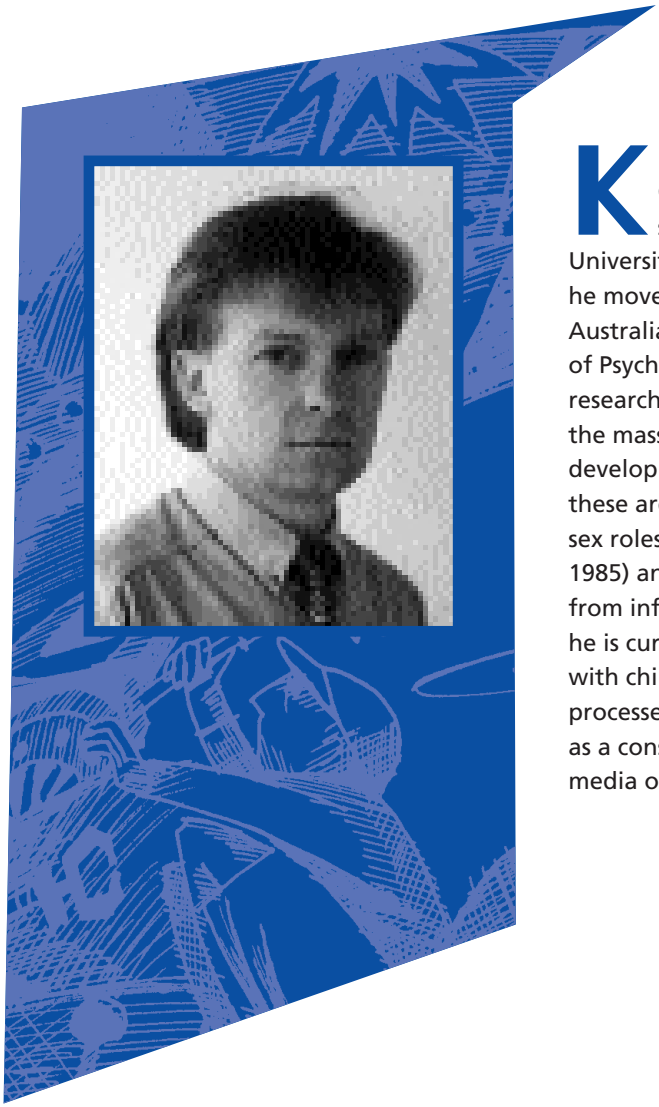
THE Office of Film and Literature Classification, which interprets legislation on behalf of the Standing Committee of Attorneys-General, has commissioned a review of the literature relating to interactive computer games. The purposes of the review were to summarise and appraise research already available, to identify gaps in our knowledge and to suggest possible directions for future research.

Of particular interest were 'cause and effect' issues relating to the behaviour of children and young people. Several other issues were identified as being relevant. These included:

- community attitudes towards computer game materials;
- adult 'concerns' about game content and their interventions in children's computer game use;
- children's motivations for playing games;
- children's perceptions of violence in computer games;
- how or if parents identify acceptable and unacceptable violence in the games;
- how adults are involved in the choice of computer games for minors in their care;
- whether adults or children consider the classification system in making game choices;
- the nature of children's favourite characters;
- whether and how children identify with favourite and/or aggressive characters; and
- the place of computer games within a spectrum of leisure activities.

The Author

THE AUTHOR



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Contents

CONTENTS

EXECUTIVE SUMMARY 1

SECTION 1. OVERVIEW OF ISSUES 4

1.1. An overview of the themes 4
1.2. Main findings 5
1.3. A note on television and computer games 5

SECTION 2. RESEARCH METHODOLOGIES 8

2.1. Case studies 8
2.1.1. Strengths of case studies 8
2.1.2. Weaknesses of case studies 9
2.2. Observational studies 9
2.2.1. Strengths of observational studies 9
2.2.2. Weaknesses of observational studies 9
2.3. Experiments 11
2.3.1. Strengths of experimental studies 11
2.3.2. Weaknesses of experimental studies 11
2.4. Correlational studies 11
2.4.1. Strengths of correlational studies 12
2.4.2. Weaknesses of correlational studies 12
2.5. Other methodological issues 12
2.5.1. Adult subjects 12
2.5.2. Measuring aggression 12
2.5.3. Other influences on social behaviour 14
2.6. Research methods: Summary 14

SECTION 3. RESEARCH CONCERNED WITH NEGATIVE CORRELATES AND EFFECTS OF COMPUTER GAMES 15

3.1. The negatives: public and professional concerns about the effects of computer games 15
3.2. The research: Studies of negative effects 16

3.2.1. Are computer games addictive? 16
3.2.1.1. The meaning of computer game addiction 16
3.2.1.2. Extent of use, affect and arousal 17
3.2.1.3. Computer game use in the home 19
3.2.1.4. Computer game use in the arcades 20
3.2.1.5. A case study of computer game addiction 22
3.2.1.6. Addiction among adults 22
3.2.1.7. Addictiveness of computer games: Summary 25
3.2.2. Do computer games impair family life, school performance, peer relations and other leisure activity? ...25
3.2.3. Do computer games promote aggression? 27
3.2.3.1. Correlational studies 27
3.2.3.1.1. Dominick (1984) 27
3.2.3.1.2. Lin and Lepper (1987) 27
3.2.3.1.3. Fling, Smith, Rodgriguez et al. (1992) 28
3.2.3.2. Experimental studies 29
3.2.3.2.1. Cooper and Mackie (1986) 29
3.2.3.2.2. Silvern (1986) 31
3.2.3.2.3. Schutte, Malouf, Post-Gorden and Rodasta (1988) 32
3.2.3.2.4. Anderson and Ford (1987) 33
3.2.3.2.5. Nelson and Carlson (1985) 35
3.2.3.3. Identification and aggression 36
3.2.3.4. Catharsis 39
3.2.3.4.1. Graybill, Kirsh and Esselman (1985) 39
3.2.3.4.2. Silvern (1986) 41
3.2.3.5. Effects of computer games on aggressiveness:Summary ...42
3.2.4. Does computer game play have negative health consequences? 43
3.2.4.1. Effects of computer games on health: Summary 45
3.3. Negative effects of computer games: Overall summary 46

SECTION 4. RESEARCH CONCERNED WITH POSITIVE CORRELATES AND EFFECTS OF COMPUTER GAMES 47

4.1. The positives: public and professional optimism about the effects of computer games 47
4.2. The research: Studies of positive effects 47
4.2.1. Do computer games promote cognitive and educational progress? 47
4.2.2. Can computer games promote social interaction among young people? 51
4.2.3. Other benefits 54
4.3. Positive effects of computer games: Summary 54

SECTION 5. CHARACTERISTICS OF COMPUTER GAME PLAYERS 55

5.1. Gender differences 55
5.2. Personality, motivations and behavioural characteristics of users 56
5.3. Characteristics of computer game players: Summary 58

SECTION 6. IMPLICATIONS FOR FUTURE RESEARCH 59

6.1. The need for Australian research 59
6.2. Aggressive content and effects 60
6.2.1. Cultural differences and aggressive content.....60
6.2.2. The need to place aggression research in a broader context 61
6.2.3. Alternative possible outcomes of playing aggressive games 61
6.2.4. Incidence and meaning of violent elements in games 62
6.3. Characteristics of successful games 64
6.4. The uses of computer games in the home and in arcades.66
6.5. Positive game content and its effects 70
6.6. The minority of excessive game players.....70
6.7. Future research: Summary 70

SECTION 7. CONCLUSIONS 71

ADDENDUM: COMMENTS FROM THE LITERATURE 73

REFERENCES 75

Executive Summary

EXECUTIVE SUMMARY

THE PURPOSE OF THIS REPORT is to provide a critical review of research into the effects of computer games on young people. Strengths and weaknesses of the available research are discussed, gaps in current knowledge are identified and priorities for future research are suggested.

The report is structured in seven sections. The contents of each section are as follows:

SECTION 1: OVERVIEW OF ISSUES

This section highlights the main findings of the review and provides an introductory overview of the themes to be developed more fully in the remainder of the report.

SECTION 2: RESEARCH METHODOLOGIES

Various research methodologies have been exploited in the research conducted to date; this section provides a discussion of the strengths and weaknesses of the four most favoured methods: case studies, observational studies, experiments and correlational studies. Each method can provide useful information, but each also has its limitations. It is stressed that research findings have to be interpreted with these limitations in mind.

SECTION 3: RESEARCH CONCERNED WITH NEGATIVE CORRELATES AND EFFECTS OF COMPUTER GAMES

Many concerns have been aired about the possible negative effects of computer games. Principal allegations are that they are addictive, that they impair family life and school performance, that they promote aggression in the young and that they are bad for children's health. Research relating to each of these claims is reviewed.

ARE COMPUTER GAMES ADDICTIVE?

Computer game activity is popular among the young, but research reveals that it ranks low compared to traditional leisure activities. Children spend much more time viewing television, or even reading, than playing computer games. Self-report studies, teacher-based surveys, small scale investigations of home usage, and observational/ interview research in video arcades all point to the conclusion that addictive involvement in computer games is quite rare.

DO COMPUTER GAMES IMPAIR FAMILY LIFE AND SCHOOL PERFORMANCE?

Studies of families during the first few months after acquiring computer games indicate that they are played with great enthusiasm at first (often by all family members), but interest tends to subside (though not disappear) subsequently. Researchers have concluded that, with few exceptions, playing computer games is a minor part of children's and adolescents' lives, and usually held in perspective with other activities.

DOES COMPUTER GAME PLAY PROMOTE AGGRESSION?

The amount of research into this important topic is still rather small. Some correlational studies have provided evidence of a modest relationship between video game play in arcades and aggressiveness ratings, but no link between home play and aggressiveness ratings. This leaves us uncertain as to causal direction. Even if we assume a causal relationship due to the video arcade, we cannot distinguish on present evidence whether the problem is the games played or the social milieu of the arcade itself.

A small number of experimental studies have been reported. Either no or minimal effects have been obtained. Some very tentative evidence indicates that aggressive game play may be cathartic (promote the release of aggressive tensions) for some individuals, though this work is open to methodological criticisms. Overall, evidence is limited, but so far does not lend strong support to the claims that computer game play promotes aggressive behaviour.

DO COMPUTER GAMES HAVE NEGATIVE HEALTH EFFECTS?

Computer games have been accused of reducing the fitness of the young, exposing people to risks of tendinitis, and causing epileptic seizures. Very little evidence has been found to support these claims. However, as with any repetitive activity, there is some risk of minor strains and headaches in individuals who spend very long periods playing games. The main conclusions emerging from the medical literature would appear to be that healthy, experienced young game players are unlikely to suffer serious problems. When physical symptoms have been recorded they have usually been found in players' adult relatives who have been caught up in enthusiasms for the games and suffered for their temporary zeal.

SECTION 4. RESEARCH CONCERNED WITH POSITIVE CORRELATES AND EFFECTS OF COMPUTER GAMES

In contrast to the above anxieties, other commentators have predicted benefits to computer game play in young people. The bulk of research into possible benefits has

been conducted by researchers interested in cognitive abilities, symbolic representation and motor skills. Many, though not all, studies in this tradition show gains following practice in specifically designed educational games.

Contrary to some fears that computers inevitably draw people into solitary activities, one major study has found that social play with computer games is twice as high as social involvement in other media use. Studies of home life indicate that computer game play appears to have improved relations within some families, and brought some together in enjoyable joint activities on a scale rarely experienced in many Western homes since the advent of television.

SECTION 5: CHARACTERISTICS OF COMPUTER GAME PLAYERS

Research addressed to the possibility that particular types of individuals are attracted to computer games is reviewed in this section. Studies of personality variables and motivations fail to provide strong or consistent evidence of differences between players and non-playing peers. The main characteristic which does differentiate players from non-players is gender: virtually every study finds greater male involvement in computer game play. The implications for future education and employment are discussed, and explanations of the gender difference outlined.

SECTION 6: POSSIBLE DIRECTIONS FOR FUTURE RESEARCH

Computer game use is likely to remain part of children's and adolescents' media experiences and may well increase as new developments in the medium arrive. It is stressed that before the implications for Australian society can be appraised fully, Australian research needs to be conducted. Possible areas for research include more sophisticated analyses of the uses and meanings of aggressive content, the place of computer games in family lives, peer interactions around computer games, the nature of adolescent use of video arcades, and the scope for socially desirable video game contents.

SECTION 7: CONCLUSIONS

It is concluded that the most dramatic anxieties about the negative effects of computer games have not been supported by the research to date. Some research indicates that there may be positive outcomes associated with computer game play, in terms of cognitive, perceptual and social development. At this stage of our knowledge, neither negative nor positive effects should be overstated but both are important issues in the face of the likely continuing appeal of this form of entertainment among young people.

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Section 1

SECTION 1

Overview of issues

RAPID developments in modern technologies mean that new media are becoming widely available to young people. In particular, the advent of relatively inexpensive computer systems is making possible a wide range of novel entertainments.

1.1. AN OVERVIEW OF THE THEMES

Rapid developments in modern technologies mean that new media are becoming widely available to young people. In particular, the advent of relatively inexpensive computer systems is making possible a wide range of novel entertainments. As with previous mass media, such as literature, comics, film, radio and television, concerns about the contents and consequences of these media are raised by parents, politicians, educators and other professionals. Many of the concerns are perennial ones: are young people becoming addicted to new media, perhaps at the expense of more desirable uses of their time, such as schoolwork, sports and socialising with peers? Do these media foster antisocial and aggressive attitudes or behaviours? Do they have deleterious health consequences?

The questions are familiar (though none the less important for that) but they are given added impetus in relation to contemporary media because of a new feature that distinguishes computerised entertainments from many of their predecessors: the interactive engagement of the player. In using a computer game, the child is taken out of his or her supposedly passive role as viewer or listener, and actually participates - often quite vigorously - in whatever possibilities the package affords. Intuitively, this suggests a more engrossing involvement, and possibly one of greater realism than other media can provide. Does this mean that the potential for learning from the medium is heightened?

In the last 15 years, a number of researchers have attempted to answer the kinds of questions that we have just noted. Compared to research on television use by young people, the investigation of computer uses is still in its infancy. However, useful work has been undertaken, and some answers are forthcoming. The purpose of this report is to provide a critical review of the work available to date, indicating its strengths and weaknesses, to identify gaps in our knowledge, and to suggest priorities for future research.

1.2. MAIN POINTS

- Negative claims about computer games include allegations that they are addictive, they impair family life and school performance, they promote aggression in the young and they are bad for children's health.
- Computer game activity is popular among the young, but research reveals that it ranks low compared to other media use.
- Leading researchers argue that what may appear to the casual onlooker as a mindless addiction may actually reflect the young player's willingness to confront challenges to improve his or her skills.
- Some correlational studies have provided evidence of a modest relationship between video game play in arcades and aggressiveness ratings.
- These studies found no link between home play and aggressiveness ratings.
- We cannot distinguish on present evidence whether the problem is the kind of individual attracted to arcades, the games played or the social milieu of the arcade itself.
- The main conclusions emerging from the medical literature would appear to be that healthy, experienced young game players are unlikely to suffer serious problems.
- Many, though not all, studies of the effects of game practice on cognitive or perceptual skills show improvements following practice in specifically designed educational games.
- Contrary to some fears that computers inevitably draw people into solitary activities, one major study has found that social play with computer games is twice as high as social involvement in other media use.
- Small scale studies of home life indicate that computer game play appears to have improved relations within some American families.
- Studies of personality variables and motivations fail to provide strong or consistent evidence of differences between players and non-playing peers.
- The main characteristic which does differentiate players from non-players is gender: virtually every study finds greater male involvement in computer game play.
- Before the implications for Australian society of research into computer games can be appraised fully, Australian research needs to be conducted.
- Possible areas for research include more sophisticated analyses of the uses and meanings of aggressive content, the place of computer games in family lives, peer interactions around computer games, the nature of adolescent use of video arcades, and the scope for socially desirable video game contents.

1.3. A NOTE ON TELEVISION AND COMPUTER GAMES

Inevitably, comparisons are drawn between the place of television in young people's lives and the place of computer games. As indicated above, some of the major concerns about the effects of games (relating to aggression, addiction, reduction of social interaction) are identical to fears that have been expressed in the past about television (and, prior to television, about radio, film and the printed word). There are some similarities in terms of the physical structures of television and computers (e.g., both use screens), and some aspects of content. Some of the research into the newer medium has borrowed paradigms from the classic TV effects studies.

Nevertheless, caution should be exercised in assuming that the effects, if any, of computer games upon children can be extrapolated from research into the effects of

television upon children. First, the effects of television upon children are themselves the subject of continuing controversy (for a variety of positions see Cumberbatch & Howitt, 1989; Comstock & Paik, 1991; Durkin, 1985; Greenfield, 1984; Hodge & Tripp, 1986; Huston et al., 1992; Palmer, 1986; Van Evra, 1990). Second, the child's experiences of the two media are qualitatively and quantitatively different. As is often pointed out, television use is active (in the sense that it involves the viewer in processing and decoding information) but computer game use is interactive: the user (player) is directly engaged with the machine and his or her input affects the progress and outcome of the game. Turkle (1984), on the basis of an extensive series of interviews of young computer users, points out that while adult critics often compare computer games to television, game players themselves rarely do so. From their perspective, a very different experience is involved.

Because different media entail different types of involvement and response on the part of the user, the roles they play in child development may sometimes differ. This could mean that any effects of computer game play are stronger than those of television, or roughly comparable, or weaker; effects due to one medium could be added to by the effects of another, or the two influences might conflict or even cancel each other out. Only research can resolve these kinds of questions, and very little research has compared these two popular media directly.

To a large extent, different media may be complementary (Greenfield, 1984): users turn to one medium for opportunities that may be missing in another. For example, television can provide viewers with high quality visual information and entertaining ready-made fictions, while computer games enable players themselves to influence the course of action. Reflecting this complementarity, there is an increasing commercial trend towards multi-media packaging of entertainments for children (e.g., with characters introduced via television subsequently becoming the focus of movies, computer games, CDs, magazines, etc.). Greenfield also points out that even within a single medium, such as computer games, different products can promote diverse experiences - some games stimulate careful reflection and planning, others invoke rapid reactions to briefly presented events.

Hence, at this stage of our knowledge, it would be premature and possibly misguided to assume that children's experiences of computer games can be understood on the basis of what we know about children and television. There may well turn out to be similarities but it is important also to be open to the possibility of discovering relationships between the young person and computer games that are unique to this medium.

Section 2

SECTION 2

Research methodologies

IT SHOULD BE STRESSED at the outset that some of the most interesting and important questions prove the most difficult to answer. To understand why , it is useful to consider the limitations of the principal research methodologies that are used, and to take note of the host of other factors that bear on the behaviour of young people.

A variety of research methodologies is available to investigators of media uses and effects. Among those which have been used in research into computer games are case studies, questionnaire-based surveys, observational studies and experiments. Other methods which are favoured by some investigators in the neighbouring topic of television effects, such as correlational field studies, have not been exploited widely in this field, probably because of the relative newness of computer games as a research topic and because of the expense and time costs incurred in running such large scale investigations. The strengths and weaknesses of each of the methods that have been used will be summarised.

2.1. CASE STUDIES

Case studies are relatively infrequent in scientific research in relation to computer game uses. However, case studies and anecdotes tend to appeal to the media because they provide vivid, personalised instances of supposedly alarming effects, and some case studies will be mentioned below.

2.1.1. STRENGTHS OF CASE STUDIES

Properly conducted case studies have the strengths (a) that a great deal of specific information can be accumulated on an individual and the background to his or her behaviour, and (b) they relate to authentic events, as distinct from laboratory manipulations (Eysenck and Nias, 1978). On these bases, they can provide useful suggestive evidence to scientists interested in pursuing causal questions more fully.

2.1.2. WEAKNESSES OF CASE STUDIES

There are also weaknesses to the case study methodology which lead most scientists to reject them as a source of conclusive evidence (cf. Eysenck and Nias, 1978). First, they do not separate relevant factors systematically. Second, the sample is not representative of the population; often, the subject is selected because he or she is a problem, not because he or she is a typical game player. Third, the method frequently entails eliciting retrospective accounts from an exceptional or disturbed individual; we cannot always be sure that his or her recall of the order of events or the salience of particular features is reliable. Fourth, some individuals may be motivated to represent the media as a source of their problems because this is preferable to accepting personal responsibility. Finally, case studies are vulnerable to the influence of the investigator, who may seek to find certain causes irrespective of the subject's responses.

2.2. OBSERVATIONAL STUDIES

In an observational study, the researcher seeks to study some behaviours as they occur spontaneously. Although observational studies can be conducted in laboratories, most of the relevant investigations in this connection are undertaken in as 'natural' an environment as possible and with minimal intrusion. For example, a researcher might observe adolescents in a video arcade. The researcher would strive to remain inconspicuous (a young researcher might be chosen for the fieldwork, and he or she would adopt the dress codes of the arcade). The demographic characteristics and patterns of behaviour of the users of the arcade would be recorded discreetly on check sheets or tape recorders.

2.2.1. STRENGTHS OF OBSERVATIONAL STUDIES

This method has the attraction that it is conducted in authentic surroundings, ideally capturing the behaviour of the participants without any influence due to the researcher's design of the setting or subjects' awareness that they are taking part in a study. It leaves the researcher scope to take note of unforeseen events.

2.2.2. WEAKNESSES OF OBSERVATIONAL STUDIES

Observational studies cannot provide information about cause and effect relationships. The investigators have no control over the participants in the study, who are self-selecting. Hence, it is not possible to determine confidently whether any characteristics identified in the subjects existed independently of the current experience.

This research method is also vulnerable to 'observer bias'. In coding ambiguous behaviours, researchers may be influenced by their own expectations. There are also logistical challenges to this kind of research: in a large, sometimes densely populated environment such as a video arcade it is difficult to monitor all relevant aspects of behaviour simultaneously. Finally, this method can provide only indirect suggestions as to how the behaviours under observation are actually experienced and understood by the participants.

observers waiting for subject to behave naturally

2.3. EXPERIMENTS

The experiment is the preferred method of many psychologists working in the field of media effects. Experimental research has been used extensively in studies of the effects of television content upon children, and several researchers have attempted to adapt paradigms from the earlier TV research to investigate the effects of computer game play.

2.3.1. STRENGTHS OF EXPERIMENTAL STUDIES

A properly conducted experiment ensures that the variables of interest are controlled systematically. The possible influence of extraneous variables is ruled out by allocating subjects randomly to conditions. The experimenter can determine exactly the conditions under which the subjects are exposed to the 'treatment' (e.g., playing a particular game) and compare their responses with those of subjects exposed to other treatments, or not exposed to any. Measures can be defined precisely and collected rigorously.

2.3.2. WEAKNESSES OF EXPERIMENTAL STUDIES

One of the principal weaknesses of many experiments is that they are conducted under conditions which differ from real life experiences. For example, subjects, in a research room, might complete a questionnaire, play one or more computer games, alone or in a group of other subjects who are instructed not to speak to each other, and then complete another questionnaire. It is possible that these departures from normal playing experiences may themselves incur departures from normal behaviour and reactions.

Many experiments are "one offs", in which the subjects play some game(s) and are then tested for "effects"; this could lead variously to underestimates or overestimates - perhaps a more continuous involvement has more intense effects, or perhaps any initial effect soon wears off.

Another problem is that the subjects might be influenced by what they perceive as the point of the exercise. They may try to guess its purpose, or they may anticipate that a certain type of response is desirable. This is a major problem in the classic studies of children's imitation of television violence and in more recent adaptations of this approach in the study of computer game effects. Young viewers or game players are presented with a doll of the type they have just watched an adult film character assault. The fact that children then "assault" the defenceless doll may tell us as much about their understanding of the situation in which they have been placed as it does about media effects (see Durkin, in press, for a fuller discussion).

2.4. CORRELATIONAL STUDIES

Correlational studies involve measuring the relationship between two or more variables. For example, the investigator might be interested in the effects of playing Pac Man on adolescents' sexual development. He or she might collect, from a sample of young people, a measure of how much Pac Man play each individual engages in per week, and a measure of his or her sexual activities, knowledge or attitudes. Again, these methods have strengths and weaknesses.

2.4.1. STRENGTHS OF CORRELATIONAL STUDIES

An attraction of this methodology is that it focuses upon naturally occurring behaviours (e.g., amount of game playing, social behaviour, spontaneous aggression) rather than laboratory-induced activities.

2.4.2. WEAKNESSES OF CORRELATIONAL STUDIES

One problem is that because subjects are not allocated at random to different conditions, differences between groups could be due to any one or more confounding variables. For example, highly aggressive individuals might choose to play highly violent games; if we find a correlation between these two variables, it is difficult to determine which came first. Another possibility is that both variables may be correlated with a third, and the third may actually be the more important. It may be that parents who allow their children unlimited opportunities to play in video arcades are also lax in other areas of managing child behaviour, such as aggression. Hence, the children may score high on computer game play and high on aggression, but the underlying cause of both behavioural patterns may be neglectful parenting.

2.5. OTHER METHODOLOGICAL ISSUES

2.5.1. ADULT SUBJECTS

Although this review is concerned primarily with computer games and young people, it will be useful occasionally to take note of research conducted with adults. It should be noted that in most cases where adults have been used as subjects, they are university students. University students are convenient to the researcher, and for some studies may be perfectly appropriate. However, it is obvious that in general this group of young adults is not representative of the general population in terms of age, intelligence, social attitudes. In some cases students may already have familiarity with the purposes of experiments into media effects.

Nevertheless, studies of adult players may serve as preliminary indicators of possible relationships that could merit further research with younger players. For example, some studies to be discussed below have found short term increases in measures of hostility and aggression following play with certain computer games; others have sought to determine exactly what features of the games most appeal to players. It is obviously of interest to ask whether the findings of these studies are borne out in research with children.

2.5.2. MEASURING AGGRESSION

One of the most pressing questions for both the general public and the research community is whether playing computer games promotes aggressive behaviour or attitudes in young people. There are serious difficulties facing researchers simply in determining whether or not aggression has taken place. Aggression is usually taken to denote acts intended to cause harm to another person or thing. However, in many studies, eliciting authentic aggression is impossible for ethical reasons. It

children playing happily
unaffected by new technologies

is also the case that the everyday play of normal children, especially boys, includes some degree of boisterousness; some researchers argue that this rough-and-tumble play is quite distinct from aggression (for example, rough-and-tumble play is entered into voluntarily and the participants usually remain friends). Unfortunately, many studies of supposed aggression may actually be measuring rough-and-tumble play (Durkin, in press). As will be seen below, some claims about the effects of computer games on aggressiveness are based on quite weak measures.

2.5.3. OTHER INFLUENCES ON SOCIAL BEHAVIOUR

One of the major obstacles to research in this area is that human social behaviour is so complex and so multidetermined that it is very difficult to attempt to isolate the independent effects of a single factor, such as computer game play. The emergence of aggression in children, for example, may be influenced by parenting styles, temperament, gender, peer relations, cognitive and moral development, school experiences, neighbourhood characteristics and community values (Durkin, in press). Any actual act of aggression could be influenced by the mood of the actor, the type of provocation, the presence and behaviour of a peer audience, and other situational variables such as the consumption of alcohol. Determining the ways in which any medium contributes to this complex equation remain challenging problems. It can be misleading to conceive of the child receiving a 'dose' of pernicious input from computer game play and then venturing forth to enact some aggressive behaviour. Even if this can be demonstrated in some instances, it is likely that variations in the other factors listed above influence the individual child's vulnerability.

Perhaps the most important point to bear in mind is that, like most of the social behaviours to be considered below, aggression has been a characteristic of human communities and their young for much longer than have computers and computer games. This does not mean that such media are irrelevant, but it does highlight the importance of viewing their contributions in context.

2.6. RESEARCH METHODS: SUMMARY

Various research methodologies are available to investigators interested in the possible consequences of playing computer games. The main methods that have been drawn upon to date have been case studies, observational studies, experiments, and correlational studies (usually employing observational and/or questionnaire data collection procedures). Each of these methods has strengths and weaknesses, and research results have to be interpreted with possible limitations in mind. It is difficult for ethical reasons to elicit authentic aggression. Genuine aggression in real circumstances is likely to reflect the operation of numerous variables rather than the unique consequences of one, such as exposure to computer games. Nevertheless, it remains of interest whether research using the above or other methods does point to a reliable link between computer game play and antisocial behaviour or attitudes.

Section 3

SECTION 3

Research concerned with negative correlates and effects of computer games

IN this section, the main allegations that have been raised about the negative effects of computer games will be summarized, and the relevant research reviewed.

3.1. THE NEGATIVES: PUBLIC AND PROFESSIONAL CONCERNS ABOUT THE EFFECTS OF COMPUTER GAMES

There was considerable public concern about young people's newfound enthusiasms for computer games and video arcades in the U.S. in the early 1980s, i.e., around the time of the first major surge in the market for home computers. This concern appears to have culminated in pronouncements during 1982 by the Surgeon General, Everett Koop, who claimed that video games may be responsible for aberrant behaviour among the young, that such games are hazardous to the health of young people, captivating "body and soul", leading to increases in tension, sleeping problems and to antisocial, aggressive behaviour (summarised in Lin & Lepper, 1987, p. 73; Selnow, 1984, p. 148).

Many related claims have been aired in popular discussions and research reviews. They include fears that computer game play:

- inhibits the development of social skills due to the seemingly nonsocial nature of the activity, may undermine family life and depress social activity with peers (Egli & Meyers, 1984);
- reduces homework effort, consumes excessive amounts of time, and diverts children from other, perhaps more desirable, leisure activities such as sports (Egli and Meyers, 1984);
- leads to school absences, diminished school performance, or even dropout (Chaffin, Maxwell and Thompson, 1982);
- may inhibit creativity (Cacha, 1983);
- may encourage aggressive behaviour, or foster undesirable problem solving skills that glamorise and glorify violence (Cacha, 1983);
- leads young people into undesirable social environments, such as game arcades (Egli

and Meyers, 1984), may encourage gambling (Griffith, 1991) and may tempt them to steal money to satisfy their addiction (Anderson and Ford, 1987);
- may encourage drug taking (Egli & Meyers, 1984);
- may cause health problems, ranging from eye strain and reduced levels of fitness to cardiovascular disease and epilepsy (Shimai, Masuda & Kishimoto, 1990);
- may exacerbate reckless attitudes towards road behaviour (e.g., as a result of playing games simulating high speed driving; Nelson & Carlson, 1986);
- may instigate or exacerbate suicidal thoughts (Nelson & Carlson, 1986); and
- may contribute to the seduction of children into 'junk consumerism' (Wark, 1994).

It should be stressed that the above researchers were identifying the concerns, and not necessarily endorsing them or providing evidence that they were valid. Indeed, a careful reading of the literature reveals that the dramatic extent of most commentators' fears is usually strongest when they have conducted no research. Notwithstanding his very firm pronouncements above, for example, the US Surgeon General Dr Koop did admit that he had 'no scientific evidence on the effects of video games on children' (quoted in Selnow, 1984). This is not surprising since virtually none had been conducted at the time he reached his conclusions about their damaging effects. However, over the last decade a number of studies have been published which help us to evaluate the validity of the early anxieties.

3.2. THE RESEARCH: STUDIES OF NEGATIVE EFFECTS

3.2.1. ARE COMPUTER GAMES ADDICTIVE?

Several studies bear on the question of addictiveness, and they will be reviewed in this section. First, the meaning and uses of the term 'addiction' will be considered, and then research concerned with the nature of children's and adults' involvement with computer games will be summarised.

3.2.1.1. THE MEANING OF COMPUTER GAME ADDICTION

While the term 'addiction' has a natural appeal to headline writers, it may not be the most accurate way to describe young people's orientation towards computer game play. It should be noted that the term is often used rather loosely, not only in popular discussions but even in some scientific literature. Strictly speaking, an addiction refers to a psychological and physiological dependence upon some stimulus in order to function (Statt, 1981). Addicts suffer withdrawal symptoms, such as shaking, craving, discomfort, even physical illness, when their dependency is not met. Indicators in these terms of addiction to computer games are not extensive in the relevant literature.

More commonly, when commentators refer to computer game play as 'addictive' what is usually meant is something like 'very popular', 'compelling' or 'time consuming'. This raises the question of what exactly it is about the activity that makes it so appealing to the player (and so appalling to some onlookers). Many investigators have concluded that the appeal rests in challenges to improve one's skills, to attain a higher level of game complexity, to persist in the face of obstacles and setbacks, to exceed one's own or some other target of excellence (Greenfield, 1984; Morlock, Yando &

Nigolean, 1985). These tend to be the kinds of reasons that young people volunteer when asked to account for their high level of game activity (Greenfield, 1984; Turkle, 1984). When the game becomes too easy or too predictable, they cease to play. In other areas of human endeavour, such as sports and hobbies, these might be regarded as harmless enthusiasms, and in still others, such as education and work, they might be regarded as virtuous motivations. It is an open question whether the fact that they are commonly labelled as signs of 'addiction' when they occur in relation to computers tells us more about the players or more about the ambivalent status of a new technology.

There is no doubt, however, that some young people do report very high levels of involvement in computer game play, sometimes to the exclusion of other activities. It is important to determine the extent to which this occurs, and the factors associated with it. The available evidence will now be considered.

3.2.1.2. EXTENT OF USE, AFFECT AND AROUSAL

In order to place findings concerning possible addiction in context, it is useful to first consider data on the relative status of game use in young people's leisure time. The evidence is consistent that computer game use accounts for only a relatively small proportion of young people's leisure time.

Dominick (1984), for example, in a survey of 250 teenagers in Georgia, USA, found that playing time for boys was on average 1 1/2 hours per week, and for girls was less than one hour. These weekly figures contrast markedly with the respondents' television use, which averaged 2 1/2 to 3 1/2 hours daily.

An impressive study conducted with 483 nine to fifteen year olds in Chicago (Kubey and Larson, 1990) provides more comprehensive figures. Although not centrally concerned with measuring addictiveness, the research was designed to investigate the frequency of use of the new media. Evidence of high frequencies would be consistent with the view that the games are dangerously addictive.

Kubey and Larson equipped each of the children with an electronic paging device and a booklet of self-report forms which they carried for one full week. The device provided signals at random intervals between 7.30 a.m. and 9.30 p.m. At these points, the children's task was to write down where they were, what they were doing, who they were with, and to complete questionnaire-style forms on their subjective state at that point. The forms measured affect (e.g., happy-unhappy, friendly-angry, cheerful-irritable), arousal (e.g., excited-bored, strong-weak), attention to the task, motivation (how much did he or she wish to do the activity?) and initiation/choice (e.g., "How much choice did you have about doing this activity?").

The study was conducted between 1985 and 1987, by which time computer games and other new media were well established in the United States. The results show that traditional media, especially television, remained by far the most popular. Television use accounted for 74% of the total amount of time the subjects were involved with media (or 13% of the total amount of time sampled). The next most frequent media activities were reading (9.1% of media time) and listening to music (8.4%). Computer game playing accounted for only 3.3% of total media involvement (or 0.6% of the total amount of time sampled). 77% of computer game play took place in the home, and the most typical location for out-of-home play was at a friend's house.

Kubey and Larson (1990) also measured the children's subjective state immediately following their involvement in the various activities reported. This procedure has the attraction that it is relatively naturalistic. It takes place in the context of the subjects' everyday lives during activities that they have usually chosen spontaneously, rather than in a laboratory following experiences controlled by the experimenter. The results showed that computer game play was associated with significantly higher levels of arousal, attention and motivation than were more traditional media activities, such as TV viewing, listening to music or reading.

On closer inspection, the major contribution to the difference in arousal related to feeling excited and feeling alert. This was the case both when playing with friends and when alone. However, still higher reports of affect and arousal were obtained when the children were sampled in video arcades, indicating that play in these locations is experienced as very engaging.

This large scale study, then, provides a picture of computer game play as a relatively low frequency leisure activity in the lives of a large sample of American youth. The authors comment that this finding 'raises questions about how concerned one realistically needs to be about the dangers these new media forms allegedly present'

This large scale study, then, provides a picture of computer game play as a relatively low frequency leisure activity in the lives of a large sample of American youth. The authors comment that this finding 'raises questions about how concerned one realistically needs to be about the dangers these new media forms allegedly present' (p. 124).

A British study conducted in the early 1980s leads to very similar conclusions. Hughes, Brackenridge and Macleod (1987) interviewed 102 primary school children who, in the early 1980s, had had little prior experience of computers. They found that the children were certainly interested in the entertainment facilities of the new technology. The most commonly mentioned use of computers was that one could 'play games' on them, and this was seen as a very commendable attribute. When the same children were re-interviewed some 16 months later (during which period the sale of home computers in the UK rose dramatically), the proportion of the sample with computers at home had risen from 7% to 40%. Among the children now with considerable computing experience, most played games sometimes and over half used their machines only to play games. However, no child in the Hughes et al. sample was found to fit the description of an addict (using computers excessively as a substitute for interpersonal relationships).

Another study of computer dependency among British school children, solicited teachers' and children's accounts of the extent of the problem (Shotton, 1989). Her data indicated that teachers identified about one child in 700 (0.14 per cent) as 'dependent' and the self-reports of children who owned microcomputers indicated that about one in 300 (0.33 per cent) regarded themselves as dependent. It should be noted that these

data are based on subjective impressions of dependency, and they concern computer use in general, rather than games in particular (though it is reasonable to assume that games would be prominent among children's uses of the computer). It might be argued that some proportion of dependent children deny the extent of their involvement. However, the children's and teachers' data appear broadly consistent, and both at such a low level that it seems implausible that there is a large scale hidden problem.

Finally, a more recent survey of 357 early adolescents in a midwestern American city found that most children who played with computer games at home did so on average between one and six hours per week; only 1% of girls and 6% of boys reported playing for 15 or more hours per week (Funk, 1993). The figures for arcade play were much lower, with a majority of the children spending no time at all in arcades and among those who did the majority spent one to two hours there. (This figure may itself be inflated, since the lowest time block available to respondents in Funk's questionnaire appears to be 1 - 2 hours.)

Overall, none of these studies suggests the presence of a widespread incidence of computer game addiction among school children. While these data provide a useful framework, it is also valuable to find out more about exactly how computer games are used, and how young people relate to them, in the various contexts they use them. Other researchers have monitored use of computer games in the home and in video arcades.

3.2.1.3. COMPUTER USE IN THE HOME

Mitchell (1985) conducted a study of the place of computer games in the lives of twenty families in the San Fransisco Bay area. The families were varied in composition (intact families, single parents, blended families), and the ages of the children ranged from 5 to 17 years. Mitchell was interested in issues such as who played and with whom, the patterns of play, parental involvement in children's play, and the families' views of the effects of home computer games, based on their own several months' experience.

Families kept weekly diaries for the first five months after acquiring a computer game set. There were variations among families in terms of amount of use, but overall the games were used on average for 42 minutes per day per family - that is, including parents and siblings. There was a decline from the amount of use in the first week of owning the games (where the mean usage amounted to 53 minutes per day) to the end of the study, by which point play had dropped to 40 minutes per day. This level of 'addiction' (broadly consistent with the figures obtained by Funk, 1993, above) compares favourably with dependence upon the primary medium in the home, television, which typically accounts for two to four hours of children's leisure activity per day.

Mitchell also conducted extensive interviews with the families, partly concerned with the question of excessive or compulsive use. She found no evidence of children becoming computer-game junkies, and parents reported that they retained reasonable control over time devoted to computer-games.

Mitchell did find one case of possible addiction - but the victim was a mother. This parent became so preoccupied with Atari Attack that she monopolized the video-game set which she had purchased, ostensibly for her sons: 'She began playing for hours in the evening before and after preparing and serving dinner. After she consistently won

the highest scores in the family on Pac Man, the boys refused to play with her. ... (the boys) commented: "She is always in front of the Atari -after school, before dinner, after dinner, late at night!. She says, 'Go away. Can't you see I'm playing?'. We used to have time to talk and be a family, but now it's always Pac Man."' (pp. 124 - 5).

However, the addiction was short-lived. The mother was a recent divorcee, who explained her interest as reflecting a desire to prove to her sons that she could master the games. Mitchell reports that 'after several weeks of high scores, her interest lagged and life returned to normal' (p. 125).

Much the same conclusion was reached in a larger, longitudinal study of American 9 to 16 year olds, whose use of home computer games was studied by Creasey and Myers (1986). These children were followed over a five month period, following the initial acquisition of the games. As with Mitchell, the researchers found high involvement at first, and some displacement of other leisure activities for a while. But this effect soon disappeared, and there was no impact upon school activities or peer involvement at any point. Creasey and Myers concluded that owning computer games does not greatly alter a child's activities beyond an initial burst of enthusiasm.

3.2.1.4. COMPUTER USE IN THE ARCADES

Children clearly do enjoy computer games. Kubey and Larson's (1990) data, above, indicate that this is especially so in video arcades. Kubey and Larson point out that the games in arcades tend to be more sophisticated than those available for home computers, and the locations afford a peer audience - which itself can be very motivating to adolescents.

This suggests that, although addicts may be rare, if they are to be found then a favourable location would be video arcades. Other researchers have attempted to discover how prevalent addicts are in these contexts. Egli and Meyers (1984) interviewed 151 males and females aged from 10 to 20 years in video game arcades in California. They found that a minority of their subjects showed signs of compulsive behaviour. About 10 - 15% of their sample reported that they played video games 12 or more hours per week; of these, a smaller proportion recorded very high figures (up to 35 hours).

It is important to recognise that this is 10 to 15% of young people sampled in game arcades (i.e., not 10 to 15% of a random sample of young people). Furthermore, people who frequent video arcades extensively stood a greater chance of being recruited to participate in the study (i.e., because the researchers were more likely to find them). Hence, the extent of compulsive involvement among young people as a whole is not settled by this study. Funk's (1993) survey, above, was based on a larger sample of teenagers recruited in a high school, and she reports that only 0.5% of girls and 1% percent of boys acknowledged spending 15 or more hours per week in arcades.

Nevertheless, the attitudes and experiences of those individuals who do report high levels of involvement are of interest. Egli and Meyers (1984) report that several of their subjects described themselves as feeling somewhat addicted to playing computer games and stated that they had a strong impulse to play them when in their environment. The researchers note that these responses were not clearly related to other measures of self-reported problems (not detailed in the report), and acknowledge that it is difficult to interpret them. They point out that it is possible that some

being cool with a computer

responses reflect denial, a common strategy among genuine addicts (such as individuals suffering from alcohol or other drug dependencies). On the other hand, it should be noted that it is sometimes socially desirable among adolescent peer groups to be perceived to be suffering from a problem, such as an addiction. For example, young novice smokers, consuming too few cigarettes per day to have reached pharmacological dependence, will describe themselves as addicted and announce that they fear withdrawal symptoms if they attempt to give up (Eiser et al., 1987). In the same way, in some adolescent subcultures, it may be 'cool' to represent oneself as addicted to computer games.

It cannot be determined from reports at one time point alone just how enduring any supposed addiction may be. It is conceivable that some young people sampled in January may perceive themselves as addicted to computer games, but questioned in June the same individuals may find themselves free of this addiction and now suffering from say, a surfeit of rollerblading, or some other fad. At present, we lack longitudinal data, but given that most studies report that the height of interest is among boys aged around the early to mid-teens, then this suggests that it is very likely that many do grow out of their 'addiction'. Note that this is quite different to the patterns of use of known addictive substances, such as nicotine and alcohol, which increase from the teenage years into young adulthood (Durkin, in press).

3.2.1.5. A CASE STUDY OF A COMPUTER GAME 'ADDICT'.

Keepers (1990) reports a case study of a 12-year-old boy who manifested a pathological preoccupation with video games. The boy stole substantial sums of money from his parents and other family members in order to fund his obsessive game playing of 4 to 5 hours per day. The boy was devoted to Ms Pac-Man, and described his involvement with the game as intensely pleasurable and absorbing.

While the child's preoccupation is disturbing, it needs to be understood in context. Keepers explains that the child's home circumstances were seriously disturbed: his parents' marital relations were very poor, and involved occasional physical attacks on one another. The father was an obsessive authoritarian who physically punished the boy frequently for minor transgressions. Keepers suggests that the child's choice of a video game in which the main purpose is to evade menacing forces may represent a defensive adapation to his well-grounded feelings of helplessness and fear. When the parents subsequently separated and the child was placed in the custody of his mother, the obsessive game playing ceased.

Although not conclusive, this case study indicates that excessive involvement may reflect a response to other stresses rather than the unfettered seductive powers of the games themselves. Furthermore, it is conceivable that in some instances high levels of game playing may be the child's preferred means of dealing with, or evading, unhappy domestic circumstances.

3.2.1.6. ADDICTION AMONG ADULTS

Another way to examine the prevalence and intensity of addiction is to sample the adult population. This may tell us something of the long-term effects of computer game involvement and/or something of the relative appeal of games for individuals who have legitimate access to other addictive pursuits. Rozin and Stoess (1993)

included computer games as one of ten activities/substances in a study of self-reported addictiveness. The researchers were interested in the question of whether there is a general personality tendency towards addiction. The subjects were 248 undergraduate students and 325 of their parents.

The first point of interest is that computer games were recorded as the second least addictive substance/activity of the ten (only gambling was rated lower). Subjects reported higher levels of addiction to alcohol, sweets, drinks with caffeine and, above all, chocolate. Only 34% of subjects declared themselves free of any symptoms of chocolate addiction, while 79% regarded themselves as completely free of computer game addiction.

The researchers then went on to discount the scores of those who registered no addiction. Thus, the extent of addiction for each substance/activity was calculated only for those who reported some addictive symptoms. On a scale of 0 to 8 (where 8 denotes strong addiction), computer game addiction tended to be quite low (with a mean of 2.33) compared to most of the other addictions (for example, the mean for coffee was 3.07, for cigarettes, 4.01). The researchers regarded scores of 3.0 or higher as indicative of substantial addiction: only 3.5% of subjects fell into this category for computer games (compared to 21% for chocolate, 18% for coffee).

In short, among this reasonably large adult sample, computer game addiction was rare and, among the minority who felt they suffered it, not intense.

Computer game addiction did not correlate strongly with any of the other addictions, though there was a moderate correlation with gambling ($r = .3$), and weak correlations with cola ($r= .21$) and alcohol ($r=.19$). The correlation with gambling is the most interesting. It tells us that there is a slight tendency for people who like gambling to enjoy computer games and vice versa. There is some overlap between these activities, in that both involve elements of luck and skill, hinging on unpredictable outcomes. Of course, as discussed above, the presence of a correlation does not confirm a causal relationship.

Rozin and Stoess also examined the correlations between spouses' addiction ratings for the various substances/activities, and between parents' and children's addictions. Addiction to chilli pepper and computer games were the only two items on which significant relationships emerged, and these obtained only between spouses. For computer games, the correlation between spouses was .33 - again, only a moderate relationship. A reasonable interpretation is that if one partner develops an interest in computer game play, he or she might enrol the other partner in the activity. Interestingly, no relationship was found between parents' ratings and those of their (young adult) children ($r= -.02$).

It should be emphasised that the subjects were not young adolescents. However, the young adults sampled here would presumably have spent their adolescence during an era of widespread availability of computer games. Furthermore, as University students they were probably exposed to the games regularly (as they tend to be popular in campus recreation areas).

In a study of adults who described themselves as dependent upon computers, and who did devote substantial amounts of their leisure time to computing, only about one third reported spending much time playing games (Shotton, 1989). Their principal interests were in activities such as exploring the potential of the computer system, mastering programming languages, debugging programs, etc. Shotton's adult subjects (recruited in 1984) would not have had exposure to computer games as children, and so

becoming curious about partner's leisure activities

the route by which they arrived at their dependency might be different to those available to contemporary children. Even so, this is another large-scale and carefully conducted investigation of a selective sample who, because of their general preoccupation with computers, might be expected to be particularly vulnerable to the addictive appeal of games; such a finding was not obtained.

Overall, computer game playing does not emerge from these studies as a high risk activity for addiction among adults, even among adults who are especially interested in computers.

3.2.1.7. ADDICTIVENESS OF COMPUTER GAMES: SUMMARY

Computer game activity is popular among the young, but ranks low compared to traditional leisure activities. This suggests that the incidence of 'addicts' in the general population of young people must be rather low. One small home-based study found that parents felt computer game play in their children was not out of control, and the only case of 'addiction' was uncovered in a parent, and that was short-lived. Surveys of teachers and high school students yield very low figures for reported 'addictions' or 'dependencies', and the duration of these predilections is not established. Among the minority of adolescents who frequent video arcades, a small proportion report very high levels of play. Data on self-reported addictions in young adults and their parents also indicate that computer games are rarely listed in this category, and that for people who do feel themselves to be somewhat addicted, the extent of that addiction is relatively modest. Although there have been very few clinical studies, it seems reasonable to conclude that most cases of supposed addiction are actually transient phases of excessive involvement rather than enduring dependencies from which the victim will find it very difficult to escape. Egli and Meyers conclude: 'In the absence of more definitive studies, the expressions of concern regarding the effect of video games on today's youth seem premature' (p. 312).

3.2.2. DO COMPUTER GAMES IMPAIR FAMILY LIFE, SCHOOL PERFORMANCE, PEER RELATIONS AND OTHER LEISURE ACTIVITY?

Egli and Meyers' (1984) high school subjects reported little interference with family life due to computer game play, felt strongly that the companionship of their friends was important to them, indicated that they participated regularly in physical sports and disagreed quite strongly that computer games promoted the use of drugs. Asked to estimate their school performance, the subjects tended to rate themselves slightly above average. Dominick (1984) found that there was no relationship between school performance and amount of time spent on home or arcade computer games.

In fact, it appears to be television consumption that is most at risk of suffering from the intrusion of computer games in the home. Several studies report reduced TV viewing and that children and parents identify TV as the activity they are most likely to displace to play with computers (Creasey and Myers, 1986; Greenfield, 1984; Mitchell, 1985), although Kubey and Larson's (1990) findings above remind us that television appears sufficiently robust a commitment for most young people that it is withstanding competition from new media very well.

Based on their larger sample, Egli and Meyers comment: 'Little support was found for the notion that playing video games reduces participation in active sports or that it is related to poor school performance. With few exceptions, playing video games was a minor part of the subjects' lives, held in perspective with other activities.'

It does remain plausible that children who are already experiencing problems in some areas of their social and/or educational activities may be inclined to spend large amounts of time playing computer games. Case studies (e.g., in Shotton, 1989; Turkle, 1984) indicate that some individuals tend to devote time and resources to computer game play as an escape from, or consolation for, perceived difficulties in interpersonal relationships. For example, Turkle describes two teenagers with high levels of involvement in games. One was unusually small for his age and, at a time when many of his peers had girlfriends, felt himself "cut off"; he also experienced problems in his relationship with his divorced parents. For him, intensive game play afforded a level of control that seemed elusive elsewhere in his life. The second boy had suffered a birth defect which affected his gait and his speech; in social contexts, he felt awkward and ugly, especially around girls, whereas in computer game play he felt calmer and almost 'perfect'.

The cautions mentioned earlier concerning the interpretation of case studies are relevant here. These children's media habits were studied because the individuals were perceived as having problems. We cannot conclude that all children with social difficulties will become excessive games players nor, conversely, that all excessive games players have impoverished social circumstances. We do not know what these individuals would have done in the absence of computer games, and it is open to conjecture whether their involvement with games is a negative or positive aspect of their otherwise relatively unhappy lives. One possibility is that their problems may have been at least partially alleviated by their recourse to computer games. Another possibility is that any weaknesses they may have had in terms of social skills might have been exacerbated by their preference for the company of computers rather than people, thus establishing a vicious cycle of poor social relations; more computer game involvement, poorer social relations, and so on. More systematic research would be required to address these issues, but it does appear that the subjects of such research would be drawn from a small minority of computer games players: these case studies relate to extreme rather than typical players.

Based on their larger sample, Egli and Meyers comment: 'Little support was found for the notion that playing video games reduces participation in active sports or that it is related to poor school performance. With few exceptions, playing video games was a minor part of the subjects' lives, held in perspective with other activities.' (1984, p. 311; see also Section 4.2.2., below).

3.2.3. DO COMPUTER GAMES PROMOTE AGGRESSION?

As indicated above, one of the most pressing concerns that has been voiced is the possibility that playing computer games with a high violence content may promote aggressive attitudes and behaviour in the players. At this stage, compared to TV research, investigation of the effects of computer games is relatively modest in scale. Most have looked at potential negative effects, though some investigators have raised the issue of possible cathartic effects (release from aggression through venting it in games). Relevant research will now be reviewed.

3.2.3.1. CORRELATIONAL STUDIES

3.2.3.1.1. DOMINICK (1984)

In a study mentioned above, Dominick (1984) conducted one of the first attempts to investigate possible relationships among media use and aggressiveness in young people. He surveyed 250 American teenagers about their uses of computer games and also collected measures of self-reported aggressive tendencies. Low but positive correlations were obtained between arcade video game use and self-reports of aggressiveness ($r = .22$ for boys, .19 for girls). No correlations were found between home use and aggressiveness. The best predictor of aggressive tendency in this study was school performance.

This early study does not indicate a strong relationship between computer game play and aggressiveness. The weak relationship obtained between video arcade play and aggressiveness is open to interpretation. As indicated in Section 2, it could be argued that a correlation reflects an influence of the games on children's dispositions towards aggression; alternatively, it could be that aggression-prone individuals are attracted to video arcades. In either case, we cannot be sure whether the games or the arcade milieu is the critical factor. But it should be emphasised that, in any case, the relationship is a weak one. This turns out to be the case in other studies, too.

3.2.3.1.2. LIN AND LEPPER (1987)

One of the most comprehensive and carefully designed correlational studies was conducted by Lin and Lepper (1987). 210 ten to thirteen year olds from two locations in California completed questionnaires about their experiences with computers and computer-based games, as well as other details of their leisure interests and aspects of their school performance. In addition, their teachers completed independent questionnaires about the students' social and academic characteristics.

The study yields a number of interesting findings:

(i) There was a modest but positive relationship between boys' arcade game use and teachers' ratings of impulsivity/aggression.
That is, boys who devoted more time to arcade play tended to be seen as more impulsive and aggressive than their peers. The authors stress that the absolute level of the relationship was not high ($r = .3$, or less than 10% of the variance). The

relationship did not obtain for girls. Furthermore, no relationship was found between boys' use of home computer games and teacher ratings of impulsivity or aggression. These results are broadly similar to Dominick's (1984) findings discussed in the previous section.

(ii) There was no relationship between teachers' ratings of the child's sociability (popularity and friendliness) and the child's use of computer games.
This was the case in respect of both arcades and home based games, and the results were the same for both sexes.

(iii) There were small, but statistically significant, negative relationships between arcade game use and teachers' ratings of boys' mathematics ability and general academic competence.
This relationship was restricted to arcade use - no relationship between home computer use and these academic measures was obtained; no relationships were obtained in the case of girls.

(iv) Computer game use appeared to supplement, rather than displace, other leisure activities.
Use of arcade and home computer games correlated modestly but significantly with other activities such as board game play, fantasy game play (for both sexes) and (among boys only) team sports.

The authors stress that their findings are correlational, and could be interpreted in various ways. As above, the finding of a modest relationship between boys' arcade game play and impulsivity/aggression ratings is consistent with the hypothesis that involvement in such activities promotes antisocial behaviour. Unfortunately, as above, the same finding is equally consistent with the hypothesis that boys who are impulsive and aggressive are more likely than others to seek out arcade video games in the first place. Recall that the children in the study were pre-adolescents; individual differences in impulsivity/aggression are established well before this age (Durkin, in press; Magnusson, 1988). As discussed earlier, another possibility is that a third factor explains the relationship: parents who fail to regulate their sons' social behaviour may also be lax in regulating their out-of-home play. Lin and Lepper acknowledge these issues and comment that only an experimental study can help resolve this debate.

3.2.3.1.3. FLING, SMITH, RODGRIGUEZ ET AL. (1992)

Fling, Smith, Rodgriguez et al. (1992) administered a questionnaire on computer game use to 153 American 11 to 14 year olds. They investigated amount and frequency of game use, the children's self-reported aggression and self-esteem, and teachers' ratings of the children's aggression and self-esteem. As in Dominick (1984) and Lin and Lepper (1987), modest correlations were found between both amount and frequency of play and both self- and teacher- ratings of aggression (Pearson rs between .19 and .26). In brief, there was a slight tendency for children rated as more aggressive to play more computer games. The researchers acknowledge that these results do not allow us to infer causality: they 'could mean that more aggressive children are drawn to computer games rather than and/or in addition to their aggression being a result of this activity' (p. 43). In any case, the relationship is not strong.

3.2.3.2. EXPERIMENTAL STUDIES

3.2.3.2.1. COOPER AND MACKIE (1986)

One of the best experimental studies of the effects of violent content available is that of Cooper and Mackie (1986). Eighty-four children, aged approximately 11 to 13 years, were paired so that one partner played an aggressive computer game, a non-aggressive computer game or a control (paper-and-pencil) game. The other partner watched the game but did not take an active part.

Play lasted for 8 minutes, and then the participants were taken to another room where a set of toys were available. These toys included one which other children had rated as highly aggressive (a 3-foot high Shogun Warrior with spring-releasing fist and dart-firers), two other toys, one rated as active and one as quiet, and a skill game. The researchers were interested in whether the type of computer game previously played influenced the amount of time the children played with the different toys. In particular: would playing the aggressive computer game lead to more time with the aggressive toy?

The children were also asked next to participate in an exercise supposedly designed to stop other children from doing "silly or bad things". Children were asked which behaviour they thought was worst: talking back, hitting someone or stealing something. Then they were asked to imagine that a child of their own age and sex had committed this bad act, and to choose one of three possible punishments for him or her (from not being allowed out to play, having restricted TV, being sent to his or her room). When they had chosen a punishment, they were shown a button which activated a punishment buzzer: the longer they pressed, the more punishment the other child would receive. Again, the researchers wished to determine whether playing the aggressive computer game led to more intense administration of punishment.

The results differed by sex. Hardly any effect of game played was detected on the boys although, not surprisingly, the boys overall displayed more interest in the aggressive (warrior) toy than did girls. Among the girls, those who had played with the aggressive game spent more time playing with the aggressive toy than the other girls (on average, 80 seconds compared to less than 16 seconds in each of the other conditions).

When it came to the administration of punishment, the boys pressed the buzzers for longer than did girls, but there were no effects of condition. That is, there was no evidence that playing the aggressive game made boys or girls more punitive.

This experiment may suggest that the dramatic consequences sometimes anticipated for children playing aggressive computer games are not readily obtained. After all, if the effects are direct, we would expect them to be at their strongest immediately after playing.

There are some limitations to the study. First, it is by no means clear that playing with an aggressive warrior toy is really a measure of aggressive disposition. It is a toy, not an authentic weapon, and no-one is hurt or threatened by it. It may offend adult sensibilities, but it is easy to see that children might be interested in playing with it for at least a minute or so (the length of time recorded in the experiment) if only to see how it operates. Indeed, in another study the same researchers (Wilder, Mackie & Cooper, 1985) found that children regarded guns as highly sex-typed for boys; since in their 1986 study Mackie and Cooper found that girls played more with the warrior post-aggressive viewing, one could equally well argue that exposure to this type of game

girl player ignoring gender imbalance

promotes counter-stereotyped behaviour in girls. We might prefer to see the radical behaviour channelled into more constructive avenues, but from one perspective it is an encouraging start.

Second, the results for girls might be explained in terms of social desirability. That is, girls aged around 11 or 12 may well be aware that it is not considered seemly for females to revel in war toys, and most spent relatively little time with it. Girls who had just played the aggressive game might have a temporarily heightened interest in things usually considered the preserve of boys, but are not necessarily likely to adopt real-life violence as a new form of social behaviour.

Third, the punishment measure is also problematic. Does willingness to administer longer punishment (none of which was violent) indicate greater aggression or greater conformity to adult rules and regulations? In any case, the results showed no effect due to type of game played.

The experiment is important, nonetheless, because it tests in relatively controlled circumstances a common allegation about the effects of computer games, and finds no support for that allegation.

3.2.3.2.2. SILVERN (1986)

Silvern (1986) describes an interesting experiment in which 4 to 7 year old children were allocated to one of three conditions: baseline (with no games or viewing), aggressive cartoon viewing (Road Runner), aggressive computer game playing (Space Invaders). Hence, this study provides a rare example of an attempt to compare the effects of different media (television and computer games).

Children were placed in pairs, so that in the computer games condition, only one member of the pair played and the other observed. The children were placed subsequently in a playroom for 10 minutes with a variety of toys available (including blocks, an airplane, toy trucks, dolls, animals, and a Bobo doll). Their behaviour in the playroom was videorecorded and analysed for verbal, physical (against another person), object and fantasy aggression.

The main findings of interest were:

(a) that there were no differences in levels of fantasy aggression among the three conditions, and instances of verbal and physical aggression were "so few that they are not worth mentioning" (Silvern, 1986, p. 66);
(b) that object aggression was nearly double in the television and computer game conditions compared with the baseline condition; and
(c) there was no difference between the television and computer game conditions in terms of amount of physical aggression.

These results indicate that the most problematic forms of aggression (aggression directed at other people) were not affected by exposure to either a television cartoon or a computer game. The children were out of the direct supervision of adults, and so this provides a reasonably unconstrained test of the short term effects of viewing/playing on social behaviour. (Of course, the experiment does not test the possibility that delayed effects might be obtained.)

Aggression against objects was higher, though, in both of the media conditions compared to children who neither viewed nor played. However, Silvern explains that most of the physical aggression was directed towards the Bobo doll, which most of the children appeared to enjoy attacking. He comments: "it was as if the doll gave special permission to be attacked" (Silvern, 1986, p. 66). As discussed earlier, it is not clear that vigorous attacks on a Bobo doll can be equated with authentic and harmful aggression - and the fact that Silvern found no instances of interpersonal aggression suggests that even these quite young children are well aware of the distinction. Overall, the study does not confirm fears that computer game play has more powerful effects on children's aggressiveness than television; in fact, in neither medium did exposure to aggressive content lead to interpersonal aggression, though both seemed to prompt vigorous play with a Bobo doll.

It should be stressed that only one cartoon and only one computer game were employed in this experiment, and viewing/play lasted for only 10 minutes. It is possible that other programmes or games, or longer durations, might lead to different results, but this remains to be tested.

3.2.3.2.3. SCHUTTE, MALOUF, POST-GORDEN AND RODASTA (1988)

In another experimental study, Schutte, Malouf, Post-Gorden and Rodasta (1988) allocated children aged 5 to 7 to two groups, one of which played a violent computer game (called Karateka), and the other played a non-violent game (called Jungle Hunt). After playing the game, children (in pairs) were placed in a different room for five minutes where two raters (blind to the subjects' experimental condition) observed them. The room contained a Bobo doll (a three foot high robust, inflatable toy, as used in the early studies of children's imitation of filmed violence) which was dressed in a karate suit, and there were also a toy jungle swing, two stuffed animal toys and two children's books.

The researchers' expectation was that more aggressive behaviour would occur in the subjects who had played Karateka, and more jungle swinging would occur in the children who had played Jungle Hunt. Unfortunately, the design did not incorporate a non-playing control condition (children who had played no game). This would have allowed for a useful comparison with the behaviour of a random group of same age children playing together with a Karate-styled Bobo doll in the vicinity but with no recent computer game influence.

The investigators counted the number of 30 second intervals during which each child acted aggressively. Only two measures differentiated between conditions: 'pushing, hitting or kicking the other child' and 'hitting or kicking the Bobo doll'. In both cases, the children in the Karateka condition scored higher. The strongest effects were notable in respect of the Bobo doll (which was the focus of aggression for, on average, 7.13 of the Karateka group's time intervals, and 4.69 of the Jungle Hunt group's). 'Pushing, hitting or kicking' the other child was observed, on average, in 1.20 of the Karateka group's intervals, and not all in the other group. Frequencies of all of the other measures were negligible.

Although only two out of six measures demonstrated a differential between conditions, and while this does not fully confirm the experimenters' predictions, it could be argued that these measures are the most telling, since they concern supposedly real actions, as distinct from pretend play.

Unfortunately, a closer look at the study does not support this interpretation. First of all, the main focus of the children's attention was clearly the Bobo doll. The researchers do seem to have demonstrated that young children quite enjoy vigorous interchanges with this defenceless opponent. It is difficult to imagine what else to do with a Bobo doll in a karate suit, and even the Jungle Hunt children appear to have worked out the possibilities very swiftly. It is true that the children who had just played with a symbolic karate protagonist (at the experimenters' request) showed greater interest in the karate Bobo doll (provided by the experimenters), but this does not establish that they had become aggressive - only that they liked this kind of game.

The less substantial but still potentially interesting record of actual aggressive acts towards peers also proves problematic. It is not clear from the report how the researchers distinguished between 'pretend to push, hit, kick' and actual examples of these behaviours.

What constituted an actual push, hit or kick? Unfortunately, the authors provide no details of these key measurement issues. It is possible that the researchers' boundaries between pretend and real were arbitrary. A child might 'pretend' to hit a peer by striking him or her lightly on the shoulder; in some contexts this could be playful. The study fails to provide information to address this point.

In fact, it is reasonable to assume that the incidence of authentic, painful attacks would be very low. We can assume that responsible scientific investigators did not flout the ethical considerations of allowing kindergarten children to continue serious assaults on one another. If for some reason they did, then it is obvious that any effective attacks would result in the victim suffering pain, most likely crying or attempting to flee, and the experiment itself would be disrupted. Recall that during the whole procedure, two strange adults were sitting at a table in the room observing the children. One might suspect that only youngsters of an already pathological disposition would engage in real violence under these conditions.

Even if we put these arguments aside and assume that the experimenters really did observe authentic violent aggression among the children, the mean number of time intervals was 1.08 but the standard deviation (an indication of the range) was quite high (2. 68). This suggests that some children have contributed rather a lot of the instances, and others none. Since there were 15 subjects in the group, it is possible that a small number of already aggressive children may have contributed most of the actions. A more plausible inference is that the children were only playing; their peers knew they were playing, and the experimenters knew they were playing, or they would have had to intervene.

In short, this experiment did not include a non-game playing control condition, but did employ stimulus materials (the karate Bobo) so inviting of 'aggressive' play that it is a greater mystery that some children may have resisted playing with it than that a majority did. Few statistically reliable effects were found, and the report does not describe adequately how the crucial measures were defined; it has been suggested here that authentic violent aggression was unlikely to have occurred.

3.2.3.2.4. ANDERSON AND FORD (1987)

Studies with adult subjects (usually, university students) have found that some games tend to evoke emotional responses of aggression and hostility (Anderson & Ford, 1987;

children and researchers behaving naturally

Mehrabian & Wixen, 1986). Anderson and Ford (1987) had student subjects play for 20 minutes with games that had been rated previously by other students as either mildly aggressive or highly aggressive; a third group (Controls) did not play any game. Subjects in all three groups then completed a questionnaire designed to measure levels of hostility, anxiety and depression. Those playing the highly aggressive game recorded the highest levels of post-game hostility, followed by those playing the mildly aggressive game; the Control subjects scored significantly lower than either experimental group. The group playing highly aggressive games also scored higher on the anxiety measure than the other two groups, and there were no differences on the measure of depression. The authors' main conclusion is that playing either mildly or highly aggressive games appears to have short term negative effects on the player's emotional state.

At least two limitations should be noted. First, it is important to recognise that the effect concerns emotional state. The measure of hostility and anxiety in this study (and also in Mehrabian & Wixen, 1986, discussed further in Section 5) concerned responses to a verbal checklist - not symbolic social behaviour, and not authentic social behaviour. Anderson and Ford are not, for example, proposing that their student subjects emerge from the study as a risk to others on campus. It is not necessarily surprising that people who have been engaged in an aggressive activity should experience feelings corresponding to the activity. Actual aggression does not invariably follow from hostility. Second, Anderson and Ford's experiment was based on a relatively small number of subjects (55 in all) allocated randomly to conditions; a stronger demonstration of effects would have required that the same subjects were tested in different conditions, or in a before-after design. Finally, as noted in Section 2.5.1., using university students in a study of the effects of aggressive media leaves open the possibility that they anticipated the results the experimenters wanted.

3.2.3.2.5. NELSON AND CARLSON (1985)

In another report on university students, Nelson and Carlson (1985) investigated reactions to the games Death Race and Demolition Derby (violent) and Le Mans and Nightdriver (nonviolent). They found that while protracted play led to increases on paper-and-pencil measures of aggression and hostility, this was obtained irrespective of whether the game played was violent or nonviolent. The researchers attribute the effect to general mood deterioration, anxiety and fatigue which are independent of game content. They also found that a clear majority of their subjects indicated that they greatly preferred the nonviolent games.

ising that university students may be too mature and too select a group to
Nelson and Carlson then went on to replicate the study
found no evidence of differential effects on mood

obtained in Nelson and Carlson's studies with
e preference. Although more subjects preferred
referred the violent games. There were no
on personality or mood measures, but there was
who preferred the nonviolent games demonstrated
l players preferred the games that taxed but did
not exceed their skill level.

In general, all players preferred the games that taxed but did not exceed their skill level.

3.2.3.3. IDENTIFICATION AND AGGRESSION

Identification is the experience of such a close involvement in the activities of a media character that one could almost be, or would wish to be like, that character. It is an intuitively appealing notion, with a plausible ring to anyone who has ever been carried away by the excitement of a movie plot. Perhaps surprisingly, the concept has received only intermittent attention in studies of media use in general and very little research at all has been addressed specifically to issues relating to identification with computer game characters.

Noble (1975), in an insightful account of children's identifications with cinema and television characters, argued that children relate to figures in different media in different ways. In movies, they tend to identify with the actor who plays the star, and one mark of this is that they are better at recalling film actors' names than the names of the characters they play. In television, conversely, they tend to identify with the character, and are often unsure of the actor's name. Noble also maintains that in identifying with a television character the individual viewer does not forget who or where he or she is; the process is closer to a social relationship with a person one knows well. He sees a contrast between this relationship to small screen characters and audience reactions to the large screen, where immersion in the character is more profound (he points out that viewers often talk to TV characters, but rarely talk to movie characters).

In light of these differences among media experiences, it is not easy to determine how profound 'identification' with computer game characters is. There are some useful descriptive studies (Kinder, 1991; Turkle, 1984) which maintain that play does nurture very strong involvement with characters in the games. Players enter new and absorbing, simulated environments in which successful performance demands total concentration on the actions, circumstances and potentialities of a particular entity. Given that some of the 'star' characters will have violent, often lethal, capacities, the processes and consequences of identification merit careful attention.

Unfortunately, the extent and meaning of any identifications that occur in these contexts have not yet been studied in any detail. Observations by Kinder and Turkle suggest that it would be an oversimplification to infer that children straightforwardly desire to 'be' or 'be like' some character they have encountered in a computer game. For a start, the medium may not provide sufficiently authentic images. Following Noble's (1975) arguments, it might be that the predominantly cartoon-like representations of the computer screen make it still more likely that the player retains awareness that there is a considerable distinction between one's self and the fictional entity. Do players really imagine themselves to be the Super Metroid or Earthworm? Even in respect of more human-like figures, Kinder (1991) notes that game magazines often warn players not to be disappointed by the differences between movie versions of game characters and the computer versions. The former are dynamic superheroes supplied in better-than-real-life cinematic glory, while the game versions are visually less exciting and their actions depend upon player skill rather than Hollywood imagination.

Of course, children may attempt to fuse information from different media. Kinder remarks that game magazines sometimes invite players to put themselves 'in the role of' Schwarzenegger or Stallone, etc.. Little is known of the outcomes. It is reasonable

to suppose that they are not always salubrious, by adult standards: that is, children or teenagers may well put themselves in the role of the Mighty Morphin Power Ranger or the Gut Gouger and embark enthusiastically upon combat and bloodshed.

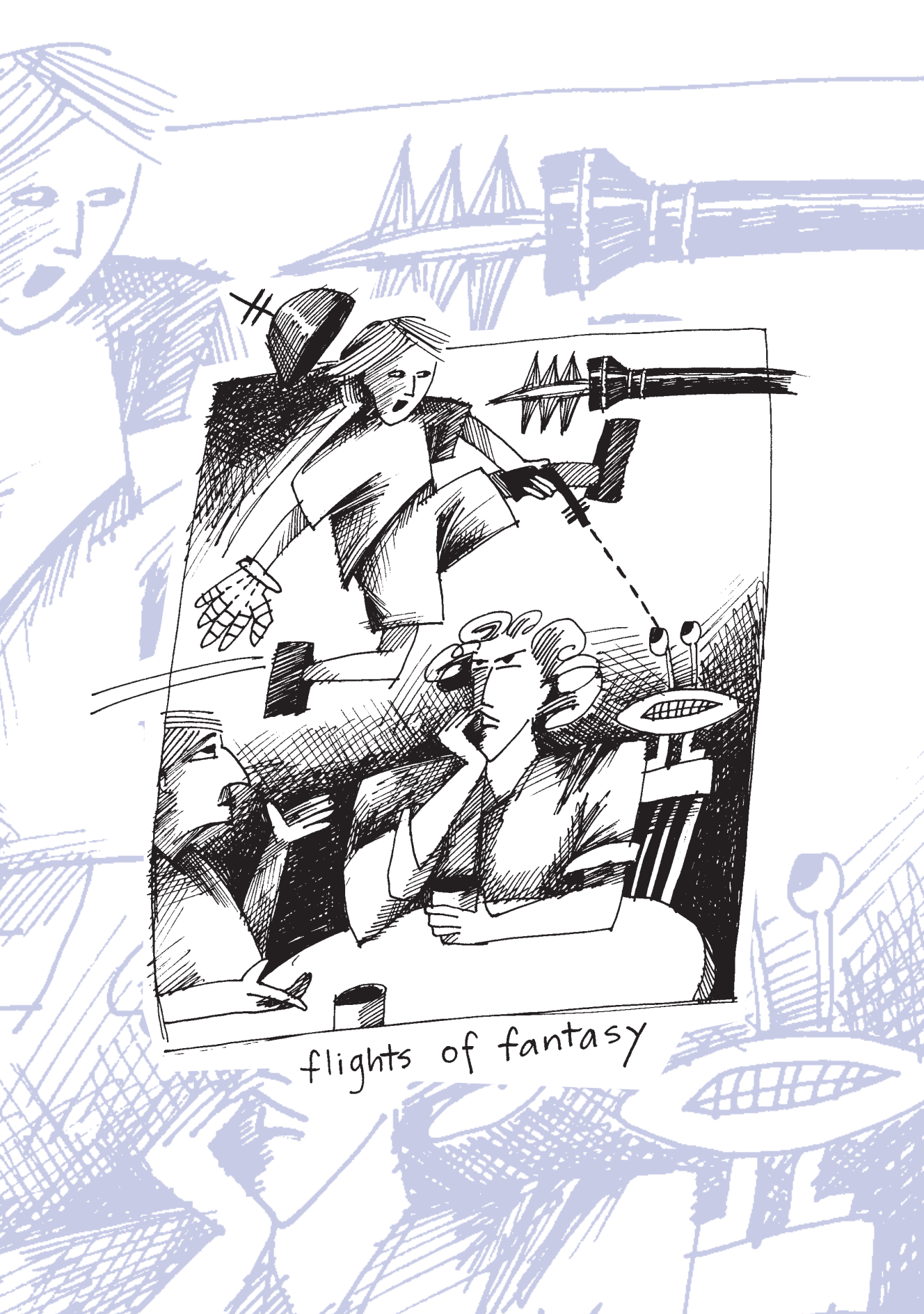
Assuming this is the case, what young players learn from these engagements is not as obvious as it may seem. Turkle (1984, p. 74) points out that a distinctive feature of the computer game environment is that there are firm rules governing behaviour: 'Unlike the real world, the game universe always conforms to rules. There is violence, murder, and theft, but the rules for what can happen and how to handle it are precise.' Identification in this context may furnish controlled fantasies, and what messages children extract from those fantasies are not fully understood.

At present, important questions remain open. One possibility is that children could, by identification with aggressive characters with extraordinary and/or grotesque powers, aspire to emulate the character in real life. This scenario is of obvious concern, but little evidence is available to suggest that it actually happens. As discussed in other sections, it is probable that even quite young children are capable of distinguishing between fantasy and real life. The most likely source of evidence for such negative outcomes is case reports by psychiatrists or clinical child psychologists. None was found in the course of preparing this review. However, if we assume that some might be forthcoming, then an earlier point should be recalled: case studies of disturbed individuals do not usually provide clear evidence of causal direction. While the issue is certainly important, we simply do not have a firm basis for concluding that rigid identifications leading to aggressive desires occur or, if they do, for estimating how widespread such responses might be.

Another possibility is that children find relief and satisfaction through identifying temporarily with characters who have exceptional means of dealing with problems and hostile forces. In this way, computer games might serve a traditional function of children's fictional media akin to Jack's axe-swinging achievements around the beanstalk or Little Red Riding Hood's decisive treatment of the big bad wolf. Again, this possibility has not been tested carefully (though some informal evidence to be discussed in Section 3.2.3.4 may cast preliminary light on the issue).

Yet another possibility arises from Noble's (1975) ideas. Noble suggests a distinction between identification with a character and recognition of that character. His own work on children's relations to television characters indicates that only about half of young viewers identify with (want to be like) the characters and about half recognise the characters (as having attributes in common with someone they know). The distinction is potentially important because it suggests that different outcomes might follow from each type of relationship. However, once again, given Noble's point about the differences in experiences of different media, we cannot assume that the same proportions hold for identification/recognition of computer game characters.

Overall, the issue of identification is certainly an interesting one, but we should beware of leaping to simplistic and alarming inferences on the basis of present evidence. Careful consideration of what might be involved in 'identification' with computer game characters suggests that the processes are more complex than a simple fusion of the player's identity with that of a two dimensional computerised hero. Importantly, the available evidence is minimal and more conclusive assessment must await future research.



flights of fantasy

3.2.3.4. CATHARSIS

The idea that emotions can be vented by intense experiences has a long history in Western thought, and can be traced back at least as far as Aristotle (Geen, 1990). The main impetus to psychological studies of catharsis came from psychoanalytically-oriented investigators, inspired by Freud. The essential thesis is that through expression of one's feelings (which could be achieved variously by a violent outburst, by revenge, by verbal expression, or by diverting aggressive energies towards some harmless outlet) one can discharge pent-up aggression; after doing so, one should feel a sense of release, and a reduced need for aggression. Evidence in respect of the theory in general is equivocal, though there is little doubt that cathartic release can occur in some contexts (Geen, 1990).

According to the catharsis hypothesis, the effects of involvement in aggressive activities should be expected to lead to a very different outcome to that predicted by other theories, such as social learning theory. According to social learning theory, individuals learn to aggress through imitating the behaviour of others, especially when they (or the models) are reinforced for aggression (i.e., achieve some positive reward for the behaviour). For the catharsis theorist, playing a violent computer game could serve as a form of release, and therefore would be expected to be followed by reduced aggressiveness. The issue leads to interesting and important questions for research into the effects of computer games but, unfortunately, evidence is limited at present.

Dominick (1984) remarks that one characteristic of intense game involvement is that players sometimes report feeling 'drained' afterwards. Some informal comments in Mitchell's (1985) study of American families are also of interest. For example, one mother in the study reported of her husband: "I'll tell you, the tenseness when he comes home from the job is incredible ... He works it off with the video-games. When he's happy with work or angry with it, a whole lot of emotions drain out with playing video-games. I am glad he can play them at home" (p. 128). Clearly, this description relates to one adult only, and reflects the limitations of case study and anecdotal data. It raises the possibility that some individuals might obtain cathartic release in this way, though how common such reactions are, and whether they occur in children, are simply unknown. As far as the present author is aware, only two published experimental studies exist, and we turn to these next.

3.2.3.4.1. GRAYBILL, KIRSH AND ESSELMAN (1985)

Graybill, Kirsh and Esselman (1985) had American primary schoolchildren (in three age groups of approximately 7, 9 and 11 years) play either a violent computer game (Activision Boxing) or a nonviolent game (Atari Basketball). Each child played for a total of eight minutes. In the boxing game, top views of two boxers are displayed and 'the object of the game is for the children's boxer to punch the computer's boxer in the face, thereby scoring points' (Graybill et al., 1985, p. 201). Children also manipulate their boxer so as to avoid blows from the computer's boxer. In the basketball game, the object is to score and defend against the computer's player.

Prior to participation in the experiment itself, children were classified as Aggressive or Nonaggressive, on the basis of a measure of peer reports (e.g., classmates answered questions such as 'Who are the children who fight?').

After playing, children were administered a projective test, the Rosenzweig Picture-Frustration (P-F) Study, designed to measure typical modes of reaction to frustration. According to Graybill et al., the P-F test involves presenting children with 24 cartoon-like pictures, each depicting 'an everyday, frustrating situation' involving two figures. The child's task is to complete a balloon in the picture, indicating what he or she thinks the frustrated individual would say. The test assumes that the child in some way identifies with the frustrated individual. These responses are then scored for direction and type of aggression. Children were also asked two questions about the game: 'Tell me what happened in the video game you played' and 'What did you like about the video game you played?'

The experiment did not yield strong evidence of effects. The game played did not influence direction of aggression (that is, whether aggressive statements were focussed on the environment or on the self, or whether aggression was evaded). There were some effects on measures of type of aggression expressed. First, Ego Defensive aggression (in which the subject tends to blame others or unavoidable circumstances, deny wrongdoing) was slightly higher among the children who had played the Basketball (i.e., the nonviolent) game. Second, there was a slight tendency (though not reaching conventional levels of statistical significance) for the children in the violent condition to reveal more need-persistent fantasies (i.e., responses which emphasize finding solutions). Third, a more complex finding was obtained in respect of Obstacle Dominance aggression; although the authors do not present all of the relevant statistics, it appears that this outcome was due to a greater focus on barriers responsible for frustration among initially nonaggressive girls who had played the violent computer game.

Graybill et al. interpret their findings as providing some initial support for the hypothesis that playing computer games affects children's aggressive fantasies on a short-term basis. There is modest evidence that children who played the violent game entertained less defensive and more need-persistent fantasies and that nonaggressive girls focussed more on the barriers responsible for frustration.

From a social learning theory perspective, the experimenters acknowledge that their findings 'are somewhat surprising and contrary to what was expected.' As noted above, if children are influenced by modelling and reinforcement processes, then the children playing the violent game should be displaying the more aggressive consequences. But this is not what was found. The authors conclude: 'If persisting to get one's needs in the absence of defensiveness is considered positive, then the results suggest that the playing of violent video games was better for the children than the playing on nonviolent video games' (p. 204; emphasis added). Graybill et al. see their findings as more consistent with psychoanalytic theories of catharsis.

It should be stressed that the study is not conclusive. The authors acknowledge limitations in terms of its short-term nature, the fact that fantasies were measured rather than attitudes, beliefs or behaviour, and uncertainties about the validity of their measure of the children's pre-existing aggressiveness. Unfortunately, post-experimental questions also provided some evidence that the Basketball game was more difficult than the Boxing game, which means that differences in behaviour following play might be influenced by other factors (such as frustration or satisfaction level). A further possible limitation is that, while apparently not involving violence, Atari Basketball does appear to have the potential to involve aggression. Graybill et al. describe the game as

allowing players to 'maneuver one of the players to make him shoot baskets, guard his own basket, and steal the ball from the computer's player' (p. 201). Thus, like many sports, the game involves elements of attack/defence, and deliberate attempts to 'steal' from one's opponent.

In defence of the experimental manipulation, Graybill et al. do report that a high proportion of children playing the Boxing game revealed some 'aggressive content' in their responses to the questions about what the game contained, while none of the children playing the Basketball game did so. However, it is not surprising that a Boxing game would elicit descriptions that are easily scored as relating to aggression; the relative lack of such descriptions in the case of the Basketball game does not establish that the experience of playing the game was devoid of aggressiveness. The point here is that the games may not have been as distinct in terms of aggressive content as the experiment required.

Overall, the study makes an interesting but necessarily inconclusive contribution to research into the effects of playing aggressive games, and raises the possibility that under some circumstances at least, such games may be cathartic.

Finally, the lack of a non-playing control group in this study also means that we cannot compare the responses of either group with children's spontaneous, unprimed responses to the P-F task. Overall, the study makes an interesting but necessarily inconclusive contribution to research into the effects of playing aggressive games, and raises the possibility that under some circumstances at least, such games may be cathartic.

3.2.3.4.2. SILVERN (1986)

The other experiment which provides some evidence relating to the catharsis hypothesis is a second study described by Silvern (1986). Following from his earlier study (discussed in Section 3.2.3.2.2.), Silvern and colleagues were interested to compare the effects of playing aggressive games cooperatively or competitively.

In the second study, children were allocated to one of three conditions:

- a baseline condition, in which no games were played;
- a cooperative condition, in which they played an aggressive computer game requiring collaboration to defend against hostile forces;
- a competitive condition, in which the participants were pitted against each other in an aggressive game.

Following the same procedures described in the earlier study (see Section 3.2.3.2.2.), the children were placed in a playroom for 10 minutes after playing and their behaviour was videorecorded.

Silvern expected to obtain support for a modeling theory of the effects of computer game play. Such a theory, which assumes children are motivated to emulate the behaviours illustrated in the media, would predict greater aggressiveness following

either of the computer game conditions than among children in the baseline (no game) condition. It might also be expected that, of the two game playing styles, the competitive format would be most likely to promote subsequent aggression, because the players have opportunities to become accustomed to 'attacking' each other. Finally, a cooperative game, in which any violence was directed at a symbolic third party in the game itself, might be expected to generate less subsequent aggression because it encourages mutual assistance and interdependence.

The results are striking. In direct opposition to the researchers' expectations, the mean frequencies of object aggression were 3.57 incidents per 10 minutes in the baseline condition, 3.25 incidents per 10 minutes in the cooperative condition, and .85 incidents in the competitive condition. That is, the highest level of object aggression was found among children who had played no game and, as Silvern comments ruefully: 'Competitive video game play significantly reduced the number of incidents of object aggression!' (p. 68).

Silvern points out that these data do not support modeling theories of the effects of aggressive game playing, but are consistent with catharsis theory. However, it should be borne in mind that, as in the earlier Silvern study, no differences among conditions were found on measures of interpersonal aggression, and the meaning of object aggression (chiefly, assaults against a Bobo doll) is open to interpretation. It is also the case that the experiment used only two games (Star Wars in the cooperative condition, Boxing in the competitive condition) and there may be unique features to these that influence players' feelings shortly after playing. Silvern stresses that the study is suggestive rather than exhaustive.

3.2.3.5. EFFECTS OF COMPUTER GAMES ON AGGRESSIVENESS: SUMMARY

To date, there are only a small number of relevant studies, and inevitably these have limitations. Lin and Lepper's correlational study was well designed, and provided evidence of a modest relationship between computer game play in arcades and aggressiveness ratings, but no link between home play and aggressiveness ratings. This leaves us uncertain as to any causal direction: the familiar problem arises that initially aggressive boys could be attracted to video arcades. Even if we assume a causal relationship due to the video arcade, we cannot distinguish whether the problem is the arcade or the games. Lin and Lepper and Fling et al. both found only modest relationships.

Two experimental studies with children have also been reported. Although these make a useful start, the weakness of these studies is that they are biased towards eliciting some kind of 'aggressive' response among children in the aggressive exposure conditions. Even so, neither study obtained the expected effect.

One study with university students did obtain modest increases on paper-and-pencil measures of hostility and anxiety among subjects exposed to aggressive games, but the implications of such findings for the study of aggressive behaviour are not clear. Another study with university students also found increases in paper-and-pencil measures, but this occurred irrespective of whether the game itself was violent or nonviolent; similar results obtained with children. That study also found that skill level, rather than violent content, influenced choice of game. It is often assumed that children 'identify' with aggressive characters in their games, but it was pointed out that identification is a complex process that has been scarcely studied in relationship to

computer game play, especially in respect of aggressive content.

Finally, very tentative evidence relating to cathartic effects has been noted, but it has been stressed that these do not provide a basis for firm interpretations. Overall, evidence is limited, but so far does not lend strong support to the claims that computer game play promotes aggression in children or adults.

3.2.4. DOES COMPUTER GAME PLAY HAVE NEGATIVE HEALTH CONSEQUENCES?

Game playing might be considered to be a physically unhealthy pursuit. Players are hunched over apparatus for long periods of time with minimal activity in the major muscle groups. Gwinup, Haw and Elias (1983) tested the blood pressure of a group of men in their 20s, before, during and after playing with a computer game called Berserk, which involves a good deal of shooting and destruction of robots. Blood pressure increased during and after play. The researchers acknowledge that the increases were relatively minor, but suggest they could pose problems to individuals with a history of cardiovascular problems. Statistically, of course, there is a lesser risk of cardiovascular disease among young people. Gwinup et al. note that the impact of the game was higher on novice players than on experienced players.

A study of Japanese parents' accounts of their preschoolers' involvement with home computers revealed that a 'relatively small' number of the 4 and 5 year olds were noted to rub their eyes, complain of tiredness in fingers, or show reduced energy after playing (Shimai et al. ,1990). The precise statistics are not provided, though it is noted that the children among whom these difficulties were observed played twice as long per day as other children (63 minutes versus 33).

On the positive side, Segal and Dietz (1991) found that the energy cost of game playing approximates that of mild-intensity exercise. In a sample of healthy, non-smoking 16 - 25 year olds, metabolic rate, oxygen consumption, heart rate and blood pressure were all elevated during play. The researchers estimate the physical activity as equivalent to walking at a pace of about 2.0 miles per hour. They emphasise, however, that game playing would not provide sufficient cardiovascular stress to improve physical fitness in young people.

Other negative health effects which have been discussed in the literature include photoconvulsive responses to the video images, or tendinitis due to excessive playing. There are reports of persons suffering epileptic seizures during play with computer games (Graf, Chatrian, Glass & Knauss, 1994; Hart, 1990). Many of these cases are individuals who had suffered similar difficulties earlier in other contexts. The age range varies (from 1 to 36 years in cases studied by Graf et al.), though the majority of patients are in their teens. This is not surprising, of course, given the appeal of the games to that age group. Hart points out that photosensitive epilepsy is extremely rare (1 in 10, 000 of the general population), and can also be instigated by naturally occurring phenomena, such as sunlight flickering through tree leaves.

Tendinitis (or the specific manifestation, 'Nintendinitis'; Brasington, 1990) has also been reported in computer game players. However, it is interesting to note that the instances of this distressing condition concern middle aged adults, not teenagers! For example, Brasington (1990) reports the case of a 35-year-old woman who was introduced to the pleasures of Nintendo and spent five hours playing without interruption; the next day, she had a very sore thumb. Green (1982) describes a

child exhausted by new technology

patient, a man aged 40, who was suffering severe pain in the elbow; upon investigation, it was discovered that the pain recurred after each occasion of spending a couple of hours in a local video game parlour with his son, playing games that require a joystick. No ill effects were recorded for the son.

Loftus and Loftus (1983) mention an instance of an 18 year old game player dropping dead, between games, of a heart attack. However, no further details are provided, and it seems improbable that this young man was in perfect health at the time he entered the video arcade.

Most of the medical studies examine direct implications of machine characteristics (limited major muscle activity, repetitive minor movements, rapidly flashing lights, noise, etc.) for the user. One tangential relationship between computer game play and health appears to have been ignored to date, and that is the possible implication of arcade play in a broader syndrome of adolescent risk taking. For example, it might be argued that adolescents who seek to avoid adult supervision, who reduce or minimise educational effort, and who spend large amounts of time either engaged with or hovering around game machines, will also tend to neglect positive health behaviours (such as exercise) and will be more prone to participate in risky behaviours that might be favoured in peer contexts (such as smoking, drinking, other drug use, casual sex).

However, this is an issue for careful research rather than oversimplified speculation. None of these risk taking activities is unique to the video arcade, and several may well be inhibited while the young people are within the establishment itself. Even if some association were found, it is not obvious what the most productive community response would be. Closing the arcade not only might redirect any problematic aspects to less visible locations, but also has the potential to reduce the amount of time during which open substance abuse is prevented. At present, we have little concrete evidence on which to assess the extent of any problem or to contemplate effective interventions.

3.2.4.1. EFFECTS OF COMPUTER GAMES ON HEALTH: SUMMARY

The main conclusions emerging from the medical literature would appear to be that healthy, experienced young game players are unlikely to suffer physical problems, while older novices with a history of heart difficulties and/or stiff joints might proceed with caution. Even so, in the course of preparing this review, no reports of the death or serious incapacitation of middle aged computer game players were uncovered. Relatively little attention has been paid to the possible relationship between high levels of arcade involvement and patterns of unhealthy lifestyles among some adolescents. It is implausible that arcades alone would 'cause' health problems, but it remains to be seen whether they are a significant factor in the health regimes of some young people and, if so, whether their contributions are predominantly negative or positive.

3.3. NEGATIVE EFFECTS OF COMPUTER GAMES: OVERALL SUMMARY

The main points arising from available research into possible negative effects of computer games is that not many have been established. The games may be very popular among some young people at certain stages of their development, but are rarely addictive. There is no evidence to support the general fear that computer game play leads to antisocial withdrawal, though it is possible that it serves as an escape for a small number of players who already have interpersonal difficulties. Some games certainly contain themes, moves and characters that have aggressive overtones, but researchers who have set out to demonstrate that children and young people are influenced to emulate aggressive content have not yet obtained the firm evidence that they expected. Finally, substantial evidence of ill-effects upon children's health has not been amassed in the medical literature.

In respect of each of the issues reviewed here, it is fair to say that the available research is not exhaustive, and future work may qualify any conclusions. Nevertheless, given the climate of dire warnings and negative expectations within which most of this research was designed, it is salutary that powerful evidence of negative consequences has not been immediately forthcoming. This is not to conclude that there are no problematic aspects to computer game play at all. It may be that the search for problems, and the development of strategies for combatting problems, would be better focussed on the small proportions of children with excessive involvements.

Section 4

SECTION 4

Research concerned with positive correlates and effects of computer games

WHILE much attention has been focussed on possibly deleterious effects of computer game play, other commentators and researchers have pointed to potentially beneficial aspects of powerful new technologies that capture children's enthusiasm.

4.1. THE POSITIVES: PUBLIC AND PROFESSIONAL OPTIMISM ABOUT THE EFFECTS OF COMPUTER GAMES

Possible benefits which have been suggested include:

- cognitive stimulation; computer games can demand high levels of skill and concentration, exploiting perceptual-motor abilities, reaction time, induction and prediction (Braun & Giroux, 1989; Greenfield, 1984);
- relaxation and enjoyment; there is little doubt that many young people derive pleasure from computer game play (Greenfield, 1984), and these are generally recognised as legitimate goals in leisure time;
- promoting the self-esteem of the player and affording children a sense of mastery; players demonstrate skill and win the acclaim of peers (Greenfield, 1984; Nelson & Carlson, 1986; Turkle, 1984);
- positive social messages; not all games are or need be oriented around contentious themes and actions (Greenfield, 1984); and
- promoting social interaction; in direct contradiction to some negative fears, others have argued that computer game play can encourage cooperation, shared activity (Lepper, 1985; Mitchell, 1985).

4.2. THE RESEARCH: STUDIES OF POSITIVE EFFECTS

4.2.1. DO COMPUTER GAMES PROMOTE COGNITIVE AND EDUCATIONAL PROGRESS?

It has been predicted that by the end of the century, most of children's education will take place via the computer (Condry & Keith, 1983; Lepper, 1985; Papert, 1980),

students accessing a whole world of information

corresponding to its impact on workplaces and business transactions. Micro computers are now widely used in education, and there are many examples of the successful use of game like activities to promote cognitive development and perceptual-motor skills (Condry & Keith, 1983; Crook, 1994; Greenfield, 1984; Hoyles, Sutherland & Healy, 1991). The accumulating evidence indicates that computer based instruction and educational activities can sometimes be more effective than conventional teaching, that the medium is highly motivating to children, and that it may be particularly useful in motivating disadvantaged or low ability students (Condry & Keith; Greenfield, 1984). Greenfield (1984, p. 142) mentions statistics from a high school in the Latino district of Los Angeles where normal absenteeism rates were 20%; from computer classes, the rate was 5%.

The extent to which computer games may contribute to educational and cognitive progress is the focus of a growing body of research. One of the most influential researchers has been Greenfield (1984), who points out that in several respects computer games can be more demanding than traditional games:

- computer games involve real-time movement where the speed of the player's reactions/ decisions affect crucially his or her survival;
- the technology allows for novel manipulations and challenges (e.g., invisible constraints on movements around the screen, entry to new levels, variations over time in the properties and powers of different characters);
- information from several sources may need to be processed simultaneously (e.g., keeping track of the locations and anticipating the actions of various characters);
- variables interact on screen in ways that could not be predicted from their individual capacities (for example, the possible interactions of Pac Man and the monsters in different locations cannot be inferred by watching either of them alone);
- some games allow the player to become involved creatively in establishing the rules or structure (Greenfield describes a Pinball Construction Set which lets the player organise the layout, control the influence of gravity, as well as vary the speed, strength and elasticity of features).

As a result of these kinds of observations, there is a great deal of interest among developmental psychologists and educators in the potential educational gains that may accrue to children as a result of playing computer games. The issues are complex and the findings varied, but there is clear evidence that improvements in perceptual and cognitive abilities can be encouraged by game practice (Greenfield, 1984, 1994; Greenfield & Cocking, 1994; McClurg & Chaille, 1987). Even three-year-olds, for example, are generally able to learn how to use simple instruments that control the direction of elements on the screen in simple, commercially produced games (Strommen, Ravazi & Medoff, 1992). This is interesting, and potentially valuable, because three year olds have limited representational ability and are still learning the spatial vocabulary to describe locations and movements.

One recent study serves as a good example of the potential cognitive benefits of computer game play. Subrahmanyam and Greenfield (1994) were interested in the issue of whether game practice could help to close the gender gap in spatial skills (on average, from early adolescence males show a slight but significant superiority over females in some spatial skills). They placed ten and eleven year old children in either an

Experimental group which played a highly spatial game called Marble Madness (which involves guiding a marble through a three dimensional grid, judging speeds and distances, and intercepting objects) or a Control group which played a non-spatial game called Conjecture (focussed on verbal puzzle solving). Children in each group played their game for a total of 2 hours and 15 minutes, spread over three 45 minute sessions. All of the children were tested before and after the game sessions on a standardised computer-based test battery of dynamic spatial skills.

The results revealed significant and substantial improvement in the spatial skills scores of the children who practised Marble Madness but not in the scores of the children in the Conjecture group. Further analysis showed that the children who were initially low in spatial skills benefited substantially from the spatial game practice, while children who were already high in spatial ability remained at the same level. The measurements of spatial skill at the start of the study revealed slightly higher error rates among the girls. There was no difference between the genders in game performance at the start of the study, but there was at the end: although both had improved, boys were performing better than girls. These results support the researchers' expectation that computer game practice can compensate for initially low spatial abilities; this holds for both sexes, though the gains appear to be greater for boys. Subrahmanyam and Greenfield found, consistent with all other research in this area, that boys had greater experience with games prior to the study, and it may be that this familiarity gave them a greater readiness to acquire new skills from computer activities.

Subrahmanyam and Greenfield's experiment was similar in design to some of those discussed earlier, concerned with the possible effects of aggressive content. One additional strength is that these researchers incorporated a before-after dimension which provides greater confidence that changes are being measured. The results are somewhat clearer, and more readily interpreted, than some of the studies of aggression effects. Importantly, the measure of spatial skills is directly related to the abilities of interest whereas measures of aggressiveness in children in experiments tend, for ethical reasons, to be more indirect (e.g., focussing on toy choice, ideas and fantasies rather than authentic aggressive behaviour).

This is not to conclude that computer game practice will invariably have positive outcomes for children's spatial (or other cognitive or verbal) development. Several other studies have also reported gains, but others have not, and some have obtained mixed results (see papers in Greenfield, 1994). Crook (1994) comments that the educational benefits of computers, including games, should not be seen as 'magic bullets' that will invariably have powerful and beneficial effects upon young minds. Much depends on the relevance of the game to the skills being tested, the qualities of the game, the relationship of the game to other developmental and educational circumstances, the age and pre-existing abilities of the children, and their motivations to take part.

Furthermore, it would be naive to infer that, if well-designed experiments show computer game effects on say, spatial development, then we can assume that computer games must have comparable effects upon social (including aggressive) development. Spatial skills are not as powerfully associated with social values and moral strictures as are aggressive responses. The children in Subrahmanyam and Greenfield's experiment above, for example, were less likely than children in an aggression experiment to have felt interpersonal expectations to behave in a particular way. Should the children

'transfer' skills practised in computer games to everyday behaviour then they are likely to find very different reactions from other people to display of spatial skills than to the display of monster-devouring or peer-bashing skills.

Other studies have found evidence to suggest that familiarity with computer games does promote more positive attitudes towards computers. In a survey of the attitudes of a sample of American adolescents, Pulos and Fisher (1987) found that in general the students were indifferent to computers. However, computer games were more popular, and there was a weak correlation between interest in computer games and interest in computers. In other words, this study is consistent with the possibility that enjoyment of computer games 'transfers' to a positive attitude towards computers. But the relationship may well work in both directions. For example, McClure and Mears (1984) found that adolescents who were comfortable with computers tended to like computer games, and enjoyed the challenges they presented; people who did not like computers did not like computer games. Adolescent subjects in Egli and Meyer's (1984) survey tended to agree strongly with the statement that 'Playing video games has made me interested in learning about how computers work'. Greenfield, Camaioni, Ercolani et al. (1994) found that, among adult students, cognitive gains arising from practice on computer games transferred to regular computer use for scientific-technical purposes.

These kinds of results cast a different light on the prospect of so-called computer game 'addiction' (discussed in Section 3.2.1). If Greenfield (1984) and others are correct in arguing that children and adolescents find computer games appealing because of the sense of challenge and mastery that they present, and if research continues to demonstrate cognitive/perceptual/motor gains as a result of practice, then the allure and consequences of the medium may repay more thoughtful attention. Greenfield captures succinctly the main point: 'Perhaps the most valuable thing we can learn is not how to make the games less addictive but how to make other learning experiences, particularly school, more so'. (Greenfield, 1984, p. 112).

Some critics foresaw computer games turning youngsters into isolated, compulsive introverts cut off from normal social interchange, others predicted that they would serve as focal points for friends and families. Most of the available findings support the latter view.

4.2.2. CAN COMPUTER GAMES PROMOTE SOCIAL INTERACTION AMONG YOUNG PEOPLE?

As mentioned above, while some critics foresaw computer games turning youngsters into isolated, compulsive introverts cut off from normal social interchange, others predicted that they would serve as focal points for friends and families. Most of the available findings support the latter view.

Studies of computer game use in the home indicate a relatively high level of social involvement in the course of game playing. Kubey and Larson (1990), in the time

sampling study described in Section 3.2.1.2., found that computer games were played alone 46% of the time, with the family 18%, and with friends 36% of the time. Importantly, play with friends was more than twice as frequent with computer games as any other media activities. Shimai et al. (1990), in a study of Japanese parents' reports on preschoolers' involvements with home computer games, found that players were on average reported as more social than nonplayers. Nonplayers were described as having fewer friends and "not speaking willingly". The researchers conclude that 'little support was garnered in the present study to show that playing had adverse effects on these kindergarten children'. (p. 776).

Rather than detract from family life, some evidence suggests that use of computer games increases joint activities at home, as parents and siblings join in (Greenfield, 1984; Kinder, 1991; Mitchell, 1985). Mitchell found that all family members were decidedly enthusiastic about this change in family life.

For example, one daughter reported an improved relationship with her father: "My dad is more sharing with the family now. Instead of falling asleep on the sofa after dinner, we get together and share the Atari. It is fun to play together ... we're all watching and cheering each other on. We really get into it. Sometimes I can beat dad, and when I do well on a hard move, he will say, "Good one!" It makes me feel good - getting his compliments and stuff' (p. 128).

Similarly, fathers commented: 'There's more friendly togetherness for some strange reason. I find her cheering me on. "Come on, Dad!" (p. 128), and 'We have more conversation, commenting, camaraderie, more complimenting of each other.' (p. 129).

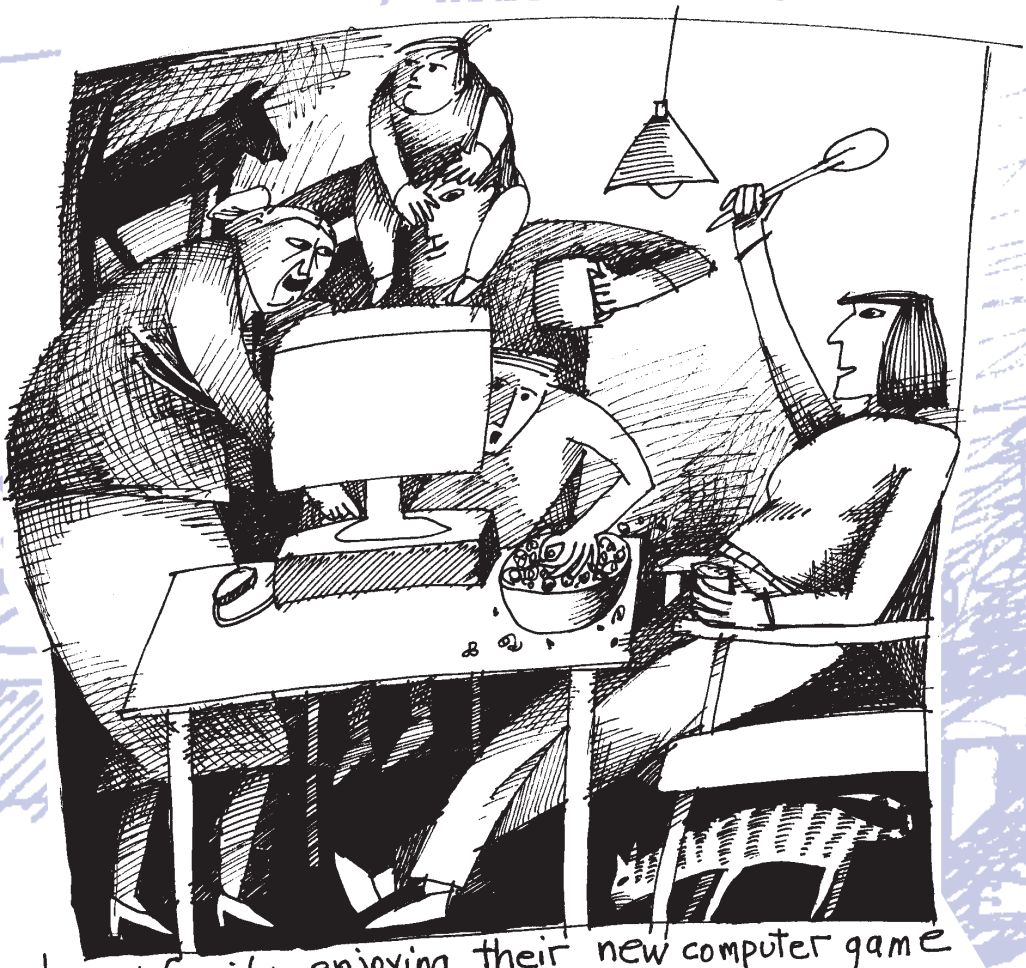
Two concluding comments from Mitchell (1985) present an account of the patterns of family involvement which contrasts markedly with the pessimistic expectations of early 1980s critics:

'It appears that the passing phenomenon of home video-games brought families together in the home in common recreational interaction more than any other activity in recent memory' (p. 132)

'Observing families during this period stirred memories reminiscent of days of Monopoly, checkers, card games, and jigsaw puzzles which were once shared on long evenings by mixed generations in families. Often accompanied by a big bowl of popcorn, families played games together and talked as they played. Many children, and even young parents, have never experienced that type of total family play and competition ' (p. 134).

If computer games are not having the deleterious effects upon family life that might have been anticipated, the possibility remains that out-of-home use, especially in arcades, puts children and adolescents at greater risk. Braun and Giroux (1989) did find that 60% of arcade clients were solitary when playing. However, it is not clear from their report whether we should conclude that the whole occasion is a solitary one, nor whether this is a negative or positive phenomenon.

First, the researchers report that 40% of the clientele came to the arcades in groups, a finding which suggests that for a substantial proportion of young people attendance is socially organised (and it may well be that others expect to see their friends at the arcades). Second, the researchers do not report on the incidence of social interaction between games; it may be that clients socialize during these times, but agree to leave each other in peace to play the games. Third, there is no inherently negative or anti-social dimension to being alone at times.



happy family enjoying their new computer game

As mentioned in Section 2.2.3, one limitation of observational studies is that they cannot address directly the perceptions of the participants. It is very likely that, if asked about their motives for attending video arcades, young people would place social contact with peers at the top of the list. This is the principal reason that adolescents usually give for their out-of-home activities (Durkin, in press). In fact, in a survey based study, Fling et al. (1992) report that prominent among 11 to 14 year olds' reasons for liking video arcades was that they provided social contact.

While a systematic study of adolescent interactions in video arcades has not been reported, there is preliminary evidence from interviews with school students that they do regard video arcade play as sociable and, often cooperative. Participants monitor each others' performance, and commend achievements (Bowman, 1982). One student commented that this contrasts with other areas of achievement:

'Very seldom have I seen fellow students congratulate each other for earning an "A". Why? Because in class we are in competition with each other for a prize which only a few are permitted to achieve. We are forced to compete against each other, not against a common goal'. (student, age not specified, in Bowman, 1982).

This does not rule out the possibility that there are other problems associated with video arcades. Poorly supervised arcades may well attract delinquent youths, and most reports indicate that video parlours tend to be male-dominated establishments. However, these problems relate to the location rather than the games themselves.

4.2.3. OTHER BENEFITS

There is some evidence that computer games can be used as rewards or distractors and thus help adults manage child behaviour. For example, it has been suggested on the basis of a preliminary study that the use of computer games as a reward for good behaviour can have positive motivational effects in the classroom on children with emotional problems (Buckalew & Buckalew, 1983).

Computer games have been used successfully in the clinical treatment of adolescent patients undergoing chemotherapy (Kolko & Rickard-Figueroa, 1985). Many patients suffer severe anticipatory distress and aversive psychological reactions to the treatment process. By making computer games available next to the treatment table, Kolko and Rickard-Figueroa achieved substantial improvements in boys aged 11 to 17, an outcome which the researchers attribute to the distracting effects of the games

4.3. POSITIVE EFFECTS OF COMPUTER GAMES: SUMMARY

The bulk of research into the benefits of computer games has been conducted by researchers interested in cognitive abilities, symbolic representation and motor skills. Many well designed training studies show gains following the use of specifically designed educational games, and several studies have provided evidence of similar benefits from entertainment games. Contrary to some fears that computers inevitably draw people into solitary activities, one major study has found that social play with computer games is twice as high as social involvement in other media use. Studies of home life indicate that computer game play appears to have improved relations within some families, and brought some together in enjoyable joint activities on a scale rarely experienced in many Western homes since the advent of television.

Section 5

SECTION 5

Characteristics of computer game players

So far we have considered research into possible negative and positive effects with little regard to the characteristics of the players themselves. As discussed earlier, an important consideration in relation to media effects is the nature of the person undergoing the activity.

5.1. GENDER DIFFERENCES

One point which has already been touched on is that computer games and video arcades tend to be of particular interest to males. In fact, every study of the spontaneous use of computer games and interest in computer games listed in the bibliography to this report found much higher levels of male involvement. Surveys of users reveal consistently that males are more likely to play and to do so more frequently (Braun & Giroux, 1989; Braun, Goupil, Giroux & Chagnon, 1986; Dominick, 1984; Griffith, 1991; Lin & Lepper, 1987; Lockheed, 1985; Loftus & Loftus, 1983; McClure & Mears, 1984; Morlock et al., 1985; Trinkhaus, 1983), although a minority of women play as frequently as men (Morlock et al., 1985). Braun and Giroux (1989) in an observational study of the Montreal video arcades found that 443 boys and 55 girls visited the arcades during the periods they were sampling. Subrahmanyam and Greenfield (1994) mention that, in attempting to recruit child participants for an experiment on computer game playing from among summer school attendees, boys were enthusiastic but not one girl agreed to take part. Overall, girls play for shorter amounts of time, tend not to develop the same level of skills as boys and tend to respond that they like computer games less than boys do.

This is an important social and educational issue since, as discussed earlier, there is evidence that familiarity with computer games helps prepare young people for more formal work with computers in education. Some writers have suggested that the outcome of this imbalance may be to inhibit female participation in a major growth industry (Greenfield, 1984; Lockheed, 1985; Shotton, 1989).

Various reasons for gender differences have been advanced. Many commentators have noted the bias in computer games towards themes and activities that traditionally appeal more to males than to females, including aggressive/action themes (Braun & Giroux, 1989; Kiesler, Sproull & Eccles, 1983). In the popular games in arcades, there are many more male figures on screen, and more male voices (Braun & Giroux, 1989). In fact, on these terms, the gender imbalance is greater than that typical of television, where males outnumber females at a ratio of 2:1 (Durkin, 1985).

Related issues include:

- some females may find the spatial and manipulative tasks difficult and unappealing;
- females may feel uncomfortable in the arcades, where macho mores prevail; Kiesler et al. (1983), for example, suggest that video arcades are analogous to the pool halls of yesteryear: male preserves, where boys gather to test their skill; Shotton (1989) notes that even school lunchtime computer classes tend to be dominated by boys and to be focussed on games with masculine themes; and
- insofar as games include elements of gambling this is seen as 'a man's domain' (Griffith, 1990, 1991).

Gender issues are obviously of wide significance in the development of this form of entertainment. At present, the majority of products seem to be geared to the perceived interests of the male adolescent market to the disadvantage of their female peers.

5.2. PERSONALITY, MOTIVATIONS AND BEHAVIOURAL CHARACTERISTICS OF USERS

A few studies have investigated the personality characteristics and motivations of players. The rationale here is that people may be attracted to the games because they perceive them as meeting certain needs. Hence, questions of interest include: do especially aggressive individuals seek to play computer games? Do pathologically disturbed people gravitate towards the activity? Do people involve themselves in computer games as a compensation for social inadequacies? What other motives do people express?

McClure and Mears (1984) administered questionnaires to 336 randomly selected American high school students to investigate the extent of computer game use and the demographic and personality characteristics of the users. 50% played twice a month or less, 22% played once a week, 19% 2 to 4 times a week, and 9% played daily. 20 percent of the sample indicated that they used part or all of their lunch money to play games. Within this 14 to 17 year old sample, younger adolescents liked the games more than did older adolescents. Overall, McClure and Mears (1984) found that frequent users tended to be more positive about computers, to be relatively bright, to read more books and to like science fiction movies rather than love movies.

In a subsequent study, again with a random sample of high school students, McClure and Mears (1986) tested directly the possibility that frequent users would suffer higher levels of psychopathologies or risk behaviours. High and low users were compared on a variety of paper-and-pencil and personality measures. On measures of deviance, neurotic pathology, happiness at home, drug use, smoking, alcohol consumption, receipt of traffic tickets for speeding, and missing classes at school

there were no differences between high-rate computer game players and low-rate players. Differences were found on measures of extroversion (extroverts played more often), achievement orientation (low rate players were more achievement oriented) and minor disciplinary infractions at school (high rate players were more likely to be in trouble).

In most respects, then, there were no differences between the two groups. However, high rate players were more extroverted, less achievement oriented and more prone to school misbehaviour. Unfortunately, McClure and Mears do not report all of the descriptive statistics for these measures, and so it is difficult to judge the extent of the differences obtained. They do comment, though, that on the several established personality instruments used, none of the subjects fell outside the normal range. Their interpretation is that computer game playing is seen as a social activity rather than an achievement oriented one, and that it is chiefly pursued for casual enjoyment rather than as a result of pathological thrill seeking or neurotic compulsions.

Gibb, Bailey, Lambirth and Wilson (1983) tested 280 computer game players, aged from 12 to 34 years, on personality measures including self-esteem, deviancy, hostility, sociability and obsessiveness/compulsiveness. Virtually no relationship was obtained between the amount of time individuals played per week and any of the measures.

Selnow (1984), in a test of the needs and interests of American teenage computer game players obtained some evidence that heavy users found interacting with the machine more enjoyable than interacting with other people, but at the same time regarded computer games as a good way to learn more about people. This seeming self-contradiction is not unusual in adolescent social reasoning, as young people during this phase are often preoccupied with the self and what other people are thinking about them (Durkin, in press).

Selnow suggested that adolescents are 'temporarily transported from life's problems by their playing' (p. 155). This is plausible, but scarcely suggests a unique or undesirable function. Adults' motives for participating in many other leisure pursuits, such as reading, TV viewing, sports, etc. are likely to include exactly the same purpose. In a similar vein, McClure and Mears (1984) asked their high school sample why they played computer games. Responses (to fixed choice items) were: 40% challenge, 26% fun, 15% to escape outside pressures.

Klein (1984) reports that as an intern school psychologist he was assigned many conduct disordered adolescents, and that the 'number one preoccupation' in the conversation of these young people was computer games: 'Video games, for many of these youths, appear to be their first priority and their singular goal' (p. 396). While this sounds alarming, it should be noted that Klein was not reporting a systematic study. For example, he did not attempt to compare these teenagers' 'number one preoccupations' with those of their normally developing peers, who may also have placed the same topic high among their interests. He does not describe any steps he might have taken to prevent his own growing suspicions of the prevalence of this preoccupation from influencing his conversations with the young people referred to him. That is, having noticed the topic recurring, he may have begun to use it as a prompt or a means of gaining rapport, thus ensuring that more and more of his clients talked about it.

Even so, it is plausible that computer games would be more popular among conduct-disordered adolescents than other agemates. Computer game playing is a form of skill-

based activity that has status among the peer community but is regarded negatively by the school system. Since conduct-disordered youths are likely to be disaffected with school, it is not surprising that they invest in alternative activities. Of course, it remains important to investigate what functions the games may serve for them and any possible influences they may have on their psychological adjustment or social behaviour.

Mehrabian and Wixen (1986) investigated the relationship between preferences among games and their emotional effects upon players (university students). Subjects played two games in a video arcade and immediately afterwards each completed a questionnaire on the game's emotional impact and their preference for the game (including questions on liking, willingness to spend money on it, probability of playing again in the near future, etc.). The researchers analysed their data for each sex separately. They found that, for males, game preference was influenced by three factors: feelings of pleasure, arousal, and feelings of dominance. For females, preference was influenced by feelings of pleasure and arousal, but dominance did not contribute significantly. Dominance here refers to feelings of control, masterfulness and adventurousness.

Although not the focus of Mehrabian and Wixen's research this finding does suggest interesting issues for future research relating to sex differences in computer game use. For example, one view might be that males seek to dominate (e.g., females and other males); by extension, one might argue that at least some males will be attracted to games oriented around extreme forms of dominance (such as sexual exploitation or warfare). Consistent with this interpretation, there is evidence that among young adolescents high users of arcade games tend to have higher scores on measures of masculinity (Melancon & Thompson, 1985). At the same time, it could be that games which provide other avenues of dominance (such as challenge and mastery demands) might serve to meet the needs of these players whilst providing more socially desirable alternatives of equal commercial value.

5.3. CHARACTERISTICS OF COMPUTER GAME PLAYERS: SUMMARY

A majority of computer game enthusiasts is male. Debate continues among researchers as to the explanation of this difference, but it is clear that many games are oriented around masculine themes, that scientific machinery such as the computer is stereotyped as masculine, and that video arcades are dominated by male players. The most serious consequence of this bias may be a disadvantage to girls in terms of developing informal familiarity with computers.

Various attempts have been made to test suspicions that people attracted to computer games may manifest personality or motivational characteristics that differentiate them from the rest of the population. None of these studies has revealed anything remarkable about computer game players. There is some evidence that themes of dominance may be more appealing to male players, but dominance tends to be more appealing to males in most domains, and there is no evidence of pathological extremes related to computer game play. In short, there is little support for the assumption that computer game players are psychologically exceptional or can be characterised by some unusual personality composition.

Section 6

SECTION 6

Implications for future research

AS stressed at the beginning of this review, research into the uses and effects of computer games is still at a relatively early stage, reflecting the recency of the medium itself. There is provisional answers to several of the questions that most concerned critics in the early 1990's, but not all of this research is conclusive and many issues have not yet been investigated. In this section, some possible issues and directions for future research are suggested.

6.1. THE NEED FOR AUSTRALIAN RESEARCH

The overwhelming majority of the research presently available has been conducted in North America or, to a lesser extent, in Britain. While it is appropriate to consider overseas findings carefully, some caution is called for before assuming that results obtained in different cultures would invariably be replicated in Australia. It is also the case that much of the American and British research is already out-of-date. Many of the studies on the extent of computer game use, and on initial adjustments of families to the purchase of computer games, were conducted in the early to mid-1980s. Although computer games had become widely used by that stage, it is possible that the level of familiarity of contemporary children may be still greater and that community attitudes and experiences may have developed. In short, some caution is called for in extrapolating from 1980s research in other Western societies to patterns of use in Australia in the mid 1990s and beyond. Another cross-cultural prompt for research within Australia comes from the observation made by Wark (1994; after Callan, 1990) that Western societies may sustain a quite different orientation towards new media developments than is sometimes found in high-tech societies, such as Japan. Wark points out that while a common Western (including Australian)

response is to treat new media with suspicion, even fear, Japanese popular culture is more receptive, regarding technological development as providing new challenges and new opportunities. To what extent it is accurate to describe Australian attitudes towards new media as fearful, hostile or negative remains to be tested - little research appears to have been conducted into Australian parents' beliefs and practices regarding computer game use by their children. It may be that there are intergenerational differences; clearly, many younger people appear quite ready to embrace computer games.

At this point in Australia's socioeconomic history, this raises an important issue for media regulators, policy makers, developmental psychologists and educators: to what extent should Australian children be encouraged to develop skills in relation to recently emerging media that are already of cultural and economic significance in leading Asian nations, and may well be the forerunners of still more innovative and ambitious technologies? Parental attitudes are likely to be an important factor in the overall pattern of interest and activity among young computer game users, but useful research could also be conducted to evaluate the consequences of any perceived adult hostility to computer games.

Finally, there appears to be no research addressed to issues concerning the uses of computer games by young people from different ethnic and cultural backgrounds within Australia. Are children from some backgrounds more or less likely to become involved in this form of computer activity, and do variations in play have implications for later differences in computer-related education? Do parents from some communities take a greater interest in their children's choices and uses of computer games? Could the demanding spatial environments of some types of games be exploited to advantage in the education of rural Aboriginal children, who have been found to have superior spatial skills to European Australians in certain contexts? Do the characters, language and other aspects of style of the commercially available games render them more or less attractive to young people from particular backgrounds?

6.2. AGGRESSIVE CONTENT AND EFFECTS

Naturally, a prominent focus of concern has been the possibility of negative effects due to interaction with violent themes and images in computer games. Some evidence is available on these matters, and tends to indicate that assumptions of powerful direct effects on behaviour are not supported. However, the research is far from exhaustive.

6.2.1. CULTURAL DIFFERENCES AND AGGRESSIVE CONTENT

First, cultural differences may be relevant. It is possible that the higher level of violence in the United States, accompanied by heightened community preoccupations with crime and personal danger, may establish a unique climate in that country in which to conduct research into the effects of violent media content. In relation to television violence, a well-known American study reported a moderate relationship between early preference for violent television and later aggressive behaviour (Lefkowitz, Eron, Walder & Huesmann, 1977). This finding is often interpreted as demonstrating an effect of violent content upon children's behaviour. Although this conclusion is itself debatable (Durkin, in press), it is important to note that an Australian replication of the study found no such relationship between television viewing and aggression, but did

While there are important issues in relation to the effects of violent content, it should be borne in mind that simplistic accounts of a direct relationship between media use and behaviour overlook the many other variables implicated in the development of aggression.

find a strong link between early aggression and later aggression (Sheehan, 1983).

With respect to the effects of computer game aggression, so far the American findings have pointed to a quite weak relationship. While this may reflect in part limitations of the studies conducted, it was noted above that if these studies had a bias, it was a bias towards finding 'effects' of aggression. By analogy with the Sheehan research on television, it is conceivable that any effects are even weaker in this country. Alternatively, it could be argued that the less violent culture of Australia may make for a better testing ground of the effects of undesirable content.

6.2.2. THE NEED TO PLACE AGGRESSION RESEARCH IN BROADER CONTEXT

While there are important issues in relation to the effects of violent content, it should be borne in mind that simplistic accounts of a direct relationship between media use and behaviour overlook the many other variables implicated in the development of aggression. As Huesmann and Miller have stressed recently: 'No one factor is viewed as necessary or sufficient to produce long-term antisocial behavior. It is understood by researchers interested in the development of aggressive behavior that repeated exposure to media violence alone is not enough to account for the development of serious antisocial behavior' (1994, p. 180). Although Huesmann believes that television violence is a potential contributor, this acknowledgement highlights the need for research which takes into account the complexity of children's social development and the contexts in which it takes place.

As has been stressed earlier in this report, we should beware of extrapolating from conclusions based on television research and assuming that they apply automatically to computer game experiences. However, one point which has been established in the history of television violence research is that much more is needed to obtain useful answers than a 20 minute exposure to a playfully violent activity in a laboratory, followed by play with an inanimate opponent. At present, the handful of studies of the effects of computer game aggression have borrowed this approach from the early television effects research, and there is a need for more elaborate investigations conducted on a longer time scale and incorporating more of the relevant variables.

6.2.3. ALTERNATIVE POSSIBLE OUTCOMES OF PLAYING AGGRESSIVE COMPUTER GAMES

Research into the effects of play with violent computer games could usefully take into account alternative possible effects, not least that the play may have beneficial consequences in some circumstances. It was noted in Section 3.2.3.3 that there are suggestions in the literature that some individuals may find that they can work off feelings of tension and hostility through computer game play involving violent content.

A more general possibility is that the absorbing nature of game play, and the demands on the player's concentration and skill performance, can help ameliorate or divert aggressive tensions. If this is so, then the mitigation of aggressive feelings or behaviour would not necessarily depend on the availability of violent content; it remains possible that any highly engaging play may have this benefit for some individuals. These possibilities have yet to be tested rigorously, but they do have interesting developmental and clinical implications. One small scale (and not fully documented) study carried out with incarcerated male juvenile delinquents found that youths who underwent a series of sessions training in computer games subsequently showed modest reductions in impulsivity and several claimed that they had benefited from the patience and relaxed concentration required by the games (Kappes & Thompson, 1985). If this result could be replicated in a larger field experiment, it may have important implications for the rehabilitation of young individuals with serious self-control difficulties.

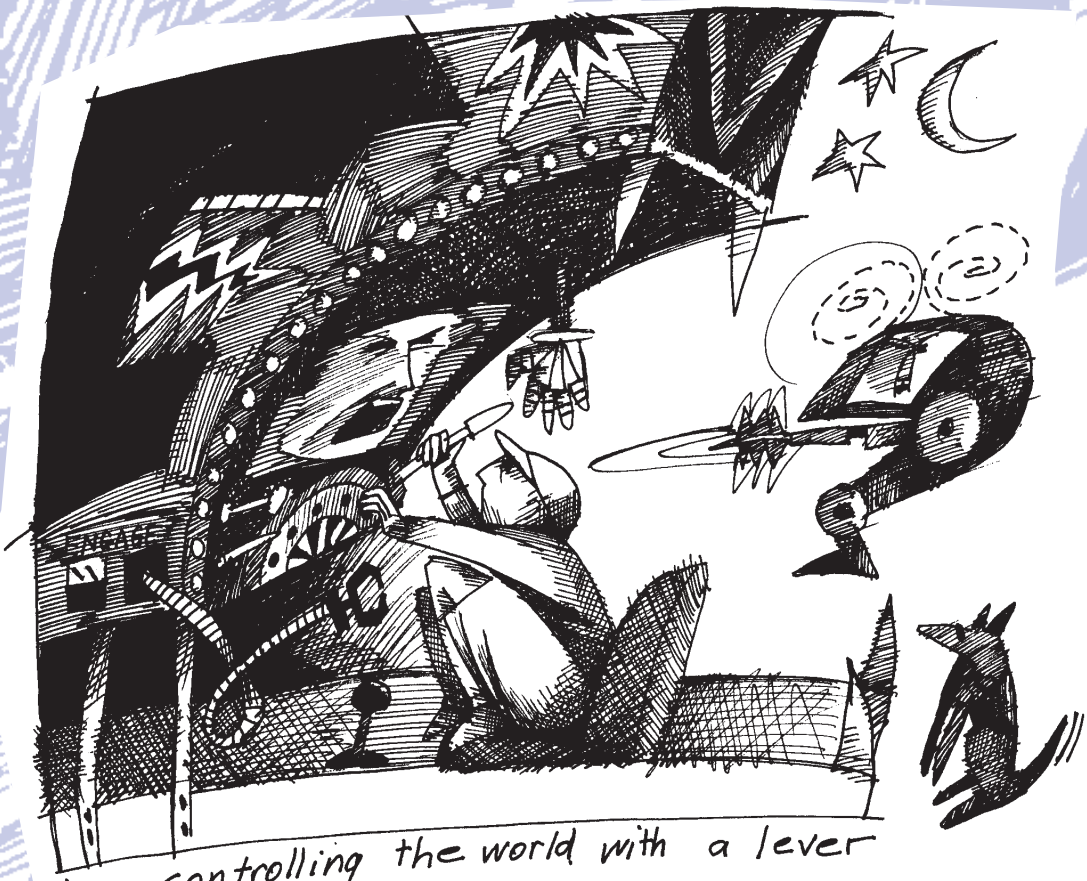
In respect of aggressive content, an interesting if speculative proposal is provided by Klein (1984), writing from a psychoanalytic perspective. He points out that most of the aggressive games are oriented around the theme of survival: the player is at odds with a dangerous environment in which he or she may have to shoot, bite or bomb first in order to avoid becoming the victim. Klein suggests that concern with survival reflects the perennial preoccupations and insecurities of adolescence. In this sense, the games are designed to accommodate young players' needs. Again, it should be stressed that this is a possibility to be tested, not an established conclusion.

One aspect of violent game play that has not been considered in research to date is that it may also alert players to the downside of violent interchanges: that is, one sometimes loses. This rarely happens in routine television or movies, where the good guys almost invariably triumph. Of course, losing in a computer game does not provide as emphatic feedback as losing in real-life violence, but insofar as ego and rewards are involved in game play, players receive frequent reminders of their vulnerability in such contexts. Players often sum up with the observation: 'One false move and you're dead' (Turkle, 1984, p. 79). Whether this has any implications for their reasoning about the dangers of real-life aggression, or whether it could be promoted to that effect, have not been investigated.

Research into these issues needs obviously to take into account the developmental status and other characteristics of the player, as well as aspects of his or her social environment (e.g., parental attitudes and caregiving style).

6.2.4. INCIDENCE AND MEANINGS OF VIOLENT ELEMENTS IN COMPUTER GAMES

Finally, much of this discussion begs the question of just how violent computer games are. There are two points to be borne in mind here. One is that content analyses of widely available games are rare. Some researchers have noted high levels of violence in popular games, but their sampling techniques and the generality of their claims are not usually described. In fact, analysing content rigorously provides some formidable problems, since the nature and intensity of any given game depend not only on what is available in the program but also upon the individual player's skills and choices. Nevertheless, it would be possible to improve upon our presently rather impressionistic and anecdotal accounts of game content. Ideally, expert players should be enlisted in any attempts to chart content more fully.



boy controlling the world with a lever

The second point is that the definition of what is violent at present varies from researcher to researcher, and equally importantly, may vary from player to player. For example, some researchers regard the very popular game of Pac Man as very violent (Pac Men combat monsters), while others regard it as an example of a nonviolent game, and some see the feminine version (Ms Pac Man) as an admirable move in the direction of enhancing female involvement in computers. It is certainly easy to see that much debate could hinge on perspective: one critic may see the Pac Man's antics as alarming representations of mindless violence, while another might argue that Pac Men (and many other game characters) are no more than electronic analogues to traditional board games in which pieces are taken, or to knock 'em down games such as skittles and ten pin bowling.

Importantly, we know little of how young people themselves regard these elements of computer games, but preliminary research suggests this may be an important question to pursue. For example, Kinder (1991), in a small scale interview study based in a video arcade, asked 11 children whether a game based on the Teenage Mutant Ninja Turtles was violent: 4 said yes, 6 said no, and 1 responded 'Don't know' - but all said that they liked this aspect of the game. Several of the children who disagreed that the game was violent insisted that the fighting was 'fun' and 'action'. Kinder asked the children whether after playing they felt like fighting with someone in real life; all 11 said no. While this is scarcely a final test of the influence of the games on social attitudes and behaviour, it is consistent with independent evidence on Australian children's reactions to the TV cartoons of the Teenage Mutant Ninja Turtles that they do distinguish readily between media violence and real life, and regard enactments of Turtle aggression in their play as fun, not intended to hurt (Durkin, 1990).

Similarly, in informal discussions with experienced computer game players the comment is often made that elements which appear grotesquely violent to the nonplaying, adult onlooker become transparent to the player, and are experienced more as steps in the game rather than as authentically brutal activities. Thus, a skeleton is extracted from a 'living' character, an enemy is subjected to the skills of the Cranium Crusher, a monster is decapitated, but the crucial development from the player's point of view is that he or she has scored a point, survived a threat, or ascended to a new level of the game. One interpretation, of course, is that via such routines young people are becoming 'densensitised' to violence. Another is that the players simply treat the images as cartoon-like jokes that are peripheral to the real point of the game. Yet another is that materials which offend middle class adult sensibilities are in themselves an attraction of the games because of their slightly rebellious and shocking flavour; many other interests and fashions of adolescents have traditionally been based on the general spirit of outraging grown-ups.

In short, there are interesting and important avenues for future research into the aggressive aspects of computer game play, but it is important to avoid some of the oversimplifications and methodological limitations that have dogged television violence research.

6.3. FACTORS INFLUENCING CONSUMER CHOICE

Systematic research is required to discover more about the features of games which are successful (in terms of market share and/or sustained user interest). While much

concern has focussed on the assumed primary appeal of violence and related 'cheap thrills', several of the studies reviewed here provide indications that violence and aggression are not necessary features to hold young people's interest in computer games. Sketching the early history of the commercially successful Nintendo games, Wark (1994) notes that part of the appeal of the seminal Donkey Kong game in 1980 was that it was one of the first to depart from the routine 'shoot 'em up' ethos of most arcade games of that time. It required a diversity of skills to manoeuvre through a complex environment and it embodied elements of playful humour and fantasy. Other research discussed in Sections 3.2.1.1. and 4.2.1. indicates that keen players are motivated by the intrinsic arousal provided by the challenges of games which require fast, highly skilled performances, and by games which proceed to ever-increasing levels of difficulty.

An interesting incidental finding reported by Anderson and Ford (1987) is that (for young adult raters) no relationship was found between the violence of a game and its enjoyment. In other words, violence is not a prerequisite nor a guarantee of appeal, at least for these subjects. Similarly, Mehrabian and Wixen (1986) interpret their findings that pleasure, arousal and dominance were strongly associated with game preference as suggesting that the appeal of games can be enhanced by aiming to generate feelings of excitement, elation and vigour. We need to know whether these findings hold more widely, among child and adolescent players.

On the other hand, one study which did attempt to determine game preferences of early adolescents came to the conclusion that violent themes were very popular. This was the survey conducted in an American high school by Funk (1993; see Section 3.2.1.2.). Respondents to a questionnaire on computer game use at home and in the arcades were asked to list their three favourite games. 228 of the total sample of 357 teenagers each listed one to three games. (The large number of non-reponses to this item may reflect the fact that not all children were interested in or familiar with computer games.) Game types were then categorised by other schoolchildren, using a framework devised by Funk. There were five catergories, listed here in order of percentage preference: Fantasy violence (31.9%), Sports (29.4%), General entertainment (19.7%), Human violence (17.0%) and Educational (1.8%).

These figures are interesting but preliminary. Funk is impressed that around 50% of preferences were concerned with violence, and adds that even under the heading Sports some violent themes could be found. Unfortunately, she provides no information at all about how violence was defined. As indicated in the previous section, it is possible to bundle together a quite diverse range of game types under this label. To repeat an earlier point, where would Pac Man fall in the above categories? It is also possible to exaggerate the significance of an aspect of content by the choice of labels. Had Funk categorised some games as 'Exotic characters', 'Space locations', 'Animal life', then a different picture may have emerged. Furthermore, even if we allow that many of the games do include elements of violence, the study does not confirm that it is these features which account for the games' appeal. Similarly, it may strike many adults as disappointing that Educational games rank so low. However, this label is not elaborated either and, in the light of evidence summarised in Section 4.2.1., it is possible that various types of games may have cognitive or perceptual pay-offs for young players, not just those packaged explicitly as 'Educational'. Indeed, perhaps it is not surprising that the overt labelling of a game as 'Educational' might be sufficient to depress the interest of many adolescents organising their leisure activity.

This is not to deny that violence (a) may be very common in computer games, and (b) may be part, possibly a prominent part, of their appeal to young players. Certainly, these possibilities merit careful attention in more detailed studies of content and player preferences. However, it remains the case that the nature, intensity and meaning of the violence need to be more fully understood. For example, if we take Funk's data at face value, it is striking that there are almost twice as many preferences for Fantasy violence as for Human violence. Is this because fantasy creatures have more grotesque repertoires of mindless violence? Or is it because closer approximations to authentic, human violence are inherently less appealing (to either game manufacturers or children)? In the absence of thorough descriptions of game content, and with still only preliminary research available on young players' own accounts of what game features are particularly appealing, these questions cannot be settled.

Among younger players, an important consideration is likely to be skill level: what factors, for example, influence the purchase decisions and patterns of play of individuals of different levels of competence? A finding of Nelson and Carlson (1985; discussed in Section 3.2.3.2.4) indicates that skilful players tend to be less interested in violent games than are novices. It is possible that violent imagery is most successful as an advertising ploy to attract new consumers (especially among young males) but is not sufficiently rewarding to sustain their interest. Fuller information could not only provide valuable pointers as to what attracts players but also stimulate research into the development of constructive and appealing alternatives to violence.

Other relevant factors may be parental monitoring and game classification. Again, little research appears to be available on these potentially important topics. Useful work could be conducted to determine to what extent parents contribute to children's game selections, what factors parents regard as salient, how children's peer networks influence choices, whether parent-child conflicts occur over purchases or rentals and how these are resolved. For example, to return to Funk's (1993) findings that over 50% of children's preferences relate to games with violent elements, should we conclude that the majority of (in this case, American) parents are quite oblivious to the levels of violence in their children's computer games? Or had many of the parents seen the games, assessed their desirability, and allowed their children to continue to use them because they judged them to be acceptable?

The Australian context presents a virtually unique opportunity to investigate any specific influence of classification information upon parent/child choice (since very few other countries have implemented systems for classifying computer games). However, no published studies have yet addressed this question.

It would be desirable in future research to distinguish between arcade and home based games. One general point which has emerged from this review is that there are important distinctions between computer game use in these two contexts

6.4. THE USES OF COMPUTER GAMES IN THE HOME AND IN ARCADES

It would be desirable in future research to distinguish between arcade and home based games. One general point which has emerged from this review is that there are

important distinctions between computer game use in these two contexts. Findings about the consequences of play in one location, whether positive or negative, should not necessarily be assumed to generalise to the other. It is very likely that different features of each environment appeal to different players. Although some of these are relatively easily pointed out (such as the more expensive technology available in arcades or the scope for unsupervised peer interaction away from home) there is a need for further research focussed on the characteristics and processes of the different environments and the relationship between them.

Although some valuable research has begun to address questions about computer game use in the home and in the arcades, this has tended to be based on small samples and the methodologies have been relatively uncontrolled. Again, from an Australian perspective, the problem stands out that most of this work has been American, and we know very little about how computer game use fits into young people's daily lives in this country.

Several issues appear particularly important. One is the suggestion arising from Mitchell's work in San Francisco that computer game play actually enhanced family relations. At its best, this new medium promotes interaction in highly engaging skilled activities. Important questions arise concerning the potential extent of such consequences for Australian families. Are these benefits reported by Australian families? Do parents play computer games with their children and/or regulate their play? Do early enthusiasms last? Does computer game play have the potential to improve relations and processes even within dysfunctional families?

Some directions for future research in this respect are suggested by the findings of a questionnaire study conducted in America (Sneed & Runco, 1992). These researchers investigated adults' and children's beliefs about the effects of television and computer games. The adults included both parents and nonparents. Parents and other adults held similar beliefs about the influence of television, but differed in their beliefs about computer games: parents tended to regard computer games more positively. Among the positives parents associated with computer game play were that it stimulated creativity and improved attention span. Although the differences between parents and nonparents were not strong, it is possible that actual experience of observing their own children play with computer games had led to parents' slightly more favourable responses. Of course, it is also possible that parents responded slightly more favourably in self-justification (reasoning that, 'if I let my kids play for hours with video games, they must be doing them some good'). Further research could be addressed to the issue of parental perceptions and experiences.

Sneed and Runco also compared the responses of parents and their children. Parents tended to be more negative in appraising the influence of television than did the children, but there were no differences in perceptions of the influence of computer games. It would be of interest to discover if this outcome was replicable with Australian families.

A limitation of Sneed and Runco's study is that the subjects were students attending human development courses, their spouses and their children. Just how well their findings would replicate in a less selective sample remains to be seen.

The second, related, issue concerns the implications of home based computer game play for peer relations. The research available so far indicates that initial fears that game players will become obsessive isolates have not been borne out: many

children appear to enjoy playing games in company with friends, and games can be a focus of collaborative play and the exchange of information and skills. However, the qualities and processes of children's spontaneous interactions around computer games have not been carefully studied. Crook (1994) shows that, with respect to computer use in classrooms, the amount of interaction is not always a good guide to the quality of the interaction. We need to know more about the nature of home based uses, taking into account the nature of alternative activities and the influences of different types of games.

The third issue concerns the nature of video arcade use by adolescents. Research is needed which distinguishes between the uses of the games and the influence of the social environment. Very little is known about the subcultures of arcade users. Previous research has shown that these are male-dominated environments, and that they are popular as meeting places for substantial numbers of young people. What goes on around the games, and whether the character of adolescent life is especially affected by the presence of the new technology, has not been investigated in any detail. There may be problems in poorly supervised arcades, though little is known of the extent of such problems in Australia. There may also be benefits, in terms of the provision of meeting places with focussed activities for young people. As noted in Section 3.2.4., the relationship between arcade involvement and patterns of health behaviour have not been investigated. More generally, at this stage, we still do not know whether video game arcades "keep kids off the streets" or provide a "haven" for delinquents (Lin & Lepper, 1987, p. 92).

One offshoot of arcade game playing which has been virtually ignored in the literature so far is the spread of this type of game into other public and commercial locations, such as shopping malls, cafeterias, video stores and so on. On first consideration, this development might appear to reflect an insidious expansion of the technology ever further into everyday life. On the other hand, it is possible that there is a natural check on the development, since presumably the management of the relevant establishments, whose primary business interests are not in computer games, would be loath to allow them to remain if they were clearly associated with rowdy or delinquent behaviour on their premises. Research could be designed to investigate whether the installation of game machines in such locations is associated with changes (negative or positive) in the extent of antisocial behaviour in the vicinity.

Finally, we know very little of the interaction between the two forms of play (home and arcade). Even basic questions, such as whether interest in home based games leads to eventual involvement in arcade subcultures, have not been addressed beyond the level of case studies. Anecdotal evidence from young players suggests that players in the different environments are regarded as having very different characteristics. There may, however, be a commercial dimension that promotes arcade interests among younger home users. For instance, a recent magazine advertisement for Battlestation II (a twin player control panel for domestic use) boasts that the instrument has 'Real arcade components'. The more expensive environment of the adolescents' arcade may project a sense of glamour and maturity to some younger players. On the other hand, despite the more elaborate facilities, arcade games are often less complex, in order to encourage rapid turnover of players/payers, and it may be that users motivated by high skill components avoid arcades or regard them as alternative forms of occasional light diversion. Both psychological and ethnographic research could be very useful in these connections.

subculture of video arcade users

6.5. POSITIVE GAME CONTENT AND ITS EFFECTS

Relatively little attention has been paid to developing video games with socially desirable themes and testing their effects. For example, more could be done to determine the effects of cooperative games, of games designed to encourage female participation, and other prosocial content. One study (Chambers & Ascione, 1987) has attempted to investigate experimentally the effects of prosocial versus aggressive game themes on children's subsequent generosity towards others. However, only weak and difficult to interpret results were obtained.

Although it would be naive to expect that computer games alone could have major effects on social attitudes and behaviour, their role in broader educational programmes remains of scientific and practical importance. Useful applied research could investigate game manufacturers' attitudes towards game content.

6.6. THE MINORITY OF EXCESSIVE GAME PLAYERS

It was argued in Section 3.2.1. that it is probably a misnomer to describe most young people's enthusiasms for computer games as an 'addiction'. Studies of amount of use reveal that only a very small proportion of children and adolescents record extreme levels of play per week (and it is rare for computer games to exceed television viewing). Further, even these individuals' patterns of use may not be enduring; most evidence points to early adolescence as the phase during which interest peaks, and any transient compulsion may be displaced by the appeal of other activities available to adolescents in due course.

Nevertheless, it is of interest to learn more about the motivations and experiences of this minority of players. Some investigations (Turkle, 1984; Shotton, 1989) indicate that some individuals may turn to computer games as a form of escape from otherwise unsatisfactory circumstances. Careful clinical research is required before we can judge whether this is invariably a negative orientation or a positive coping strategy from which the developing person will acquire resources that assist subsequent development. Similarly, strategies that adults might adopt to deal with children in these conditions need to be appraised systematically rather than be taken up as intuitively obvious solutions.

6.7. FUTURE RESEARCH: SUMMARY

Computer game use is likely to remain part of children's media experiences and may well increase as new developments in the medium arrive. Over the last ten years, a body of research has grown, but it remains inconclusive on some issues and preliminary or negligible on others. It has been stressed here that before implications for Australian society can be fully appraised, Australian research needs to be conducted. Possible areas for research include more sophisticated analyses of the uses and meanings of aggressive content, the place of computer games in family lives, adolescent involvement in video arcades, and the scope for socially desirable video game contents.

Section 7

SECTION 7

Conclusions

COMPUTER games have not led to the development of a generation of isolated, antisocial, compulsive computer users with strong propensities for aggression.

Like most media, computer games can be put to good or ill use. The contents of the games can range from the banal to the intellectually stimulating to the horrific. Unfortunately, different users and observers may arrive at different conclusions as to which particular features or experiences merit which description. The nature of play can range from the excessive investment of time and energies by seemingly aimless adolescents, to the beginnings of computer literacy for many children, to calming and absorbing involvement by distressed young people, to fun-filled, shared activity among friends or whole families. Different users and observers may vary in their emphasis on the negative or positive dimensions of game play. The most dramatic fears about the effects of computer games on the young were expressed in the United States in the early 1980s. At that point, the games were becoming very popular but little research into their uses and effects had been conducted. Over the last decade, a body of research has grown. 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.

To the contrary, some evidence indicates that there may be cognitive and perceptual-motor skill gains as a result of computer game practice. In respect of social behaviour, there are interesting American findings that computer game play can promote high levels of family involvement, reviving patterns of family togetherness in leisure that, for many, seemed to have diminished or died out with the advent of television. It should be emphasized, however, that these findings are based on small scale studies, and much remains to be discovered about the uses of computer games in Australian homes and leisure areas.

It remains desirable - at both policy and domestic levels - for responsible adults to monitor the kinds of games that children are playing and the extent to which they play them. There is a continuing need for research into both the negative and the positive

features of computer games. In respect of some issues (such as females' relative inexperience of computers), a possible conclusion is that we need to seek ways to promote more computer game play among the young. In respect of others (such as the decidedly small minority of young people who devote excessive amounts of time to game playing), we need more careful study of what motivates the player, what consequences follow from particular levels of involvement, and what might be the appropriate form(s) of intervention. In respect of one of the most controversial aspects of game content, violence, it may be more productive to move beyond global condemnation of a little-studied entertainment form towards more extensive analyses of what is actually involved, what it means to different players, and what the outcomes are. From the perspective of those making classification decisions, all of this information and more bears on the difficult task of serving community interests in the face of a new and diverse technology.

Comments from the literature

'It seems that far from being lazy or seeking mindless games, children look for games that challenge them'

'Extreme positions have been taken by public figures with little or no knowledge of the psychological mechanisms likely to play a role in determining the effects of video games' (Anderson and Ford, 1987, p. 391).

'for many people, the video game debate is a place to express a more general ambivalence: the first time anybody asked their opinion about computers was when a new games arcade applied for a licence in their community or when the owner of a small neighbourhood business wanted to put a game or two into a store, It is a chance to say, "No, let's wait. Let's look at this thing more closely."' (Turkle, 1984, p. 60).

'It seems that far from being lazy or seeking mindless games, children look for games that challenge them' (Greenfield, 1984, p. 111).

'for adults and children who play computer games, who use the computer for manipulating words, information, visual images, and especially for those who learn to program, computers enter into the development of personality, of identity, and even of sexuality' (Turkle, 1984, p. 6).

'It cannot be denied that the popular arcade video games have some redeeming recreational value in the sense that they promote tremendous mental exertion in a sort of perceptual-cognitive-motor gymnastics' (Braun & Giroux, 1989, p. 100).

'Because it can be programmed, the computer is a highly flexible medium, and the possibilities are endless' (Greenfield, 1984, p. 113).

'For many [children] the first time they stand in front of a computer they can master is when they play their first video game' (Turkle, 1984, p. 9).

‘Millions of parents have bought computer toys hoping they will encourage their children to practice spelling, arithmetic, and hand-eye coordination. But in the hands of the child they do something else as well: they become the occasion for theorizing, for fantasizing, for thinking through metaphysically charged questions to which childhood searches for a response’ (Turkle, 1984, p. 20).

‘Observing families during this period [first weeks of computer game ownership] stirred memories reminiscent of days of Monopoly, checkers, card games, and jigsaw puzzles which were once shared on long evenings by mixed generations in families. Often accompanied by a big bowl of popcorn, families played games together and talked as they played. Many children, and even young parents, have never experienced that type of total family play and competition ’ (Mitchell, 1985, p. 134).

‘There is nothing mindless about mastering a video game. The games demand skills that are complex and differentiated. ... And when one game is mastered, there is thinking about how to generalize strategies to other games. There is learning how to learn.’ (Turkle, 1984, p. 61).

‘If there is a danger here, it is not the danger of mindless play but of infatuation with the challenge of simulated worlds. In the right circumstances, some people come to prefer them to the real. This danger is not specific to games; it reflects one of the ways in which the games are a microcosm of computation.’ (Turkle, 1984, p. 77).

‘The verdict? If you want a good punch and kick stress reliever to live out your fantasy of inflicting incredible physical violence on your boss, then this is the game for you. On the other hand, if you’re even remotely concerned about video game violence, then it’s probably best that you don’t even know this one exists.’ (Tellzen, 1995, reviewing Street Fighter II in The Australian, 31 January.)

‘You walk out of the arcade and it’s a different world. Nothing that you can control’ (young game player, talking to Turkle, 1984, p. 66).

‘It’s comforting to note too that the Task Force placed some emphasis on parental control over modem use by their kids, if only “to control the size of the telephone bill”. It’s a pity they didn’t have so much faith in parental supervision when they decided to regulate our beloved games’ (Editorial in Hyper, December, 1994).

‘I am convinced that the people who criticize video games do not understand what the games involve’ (Greenfield, 1984, p. 97).

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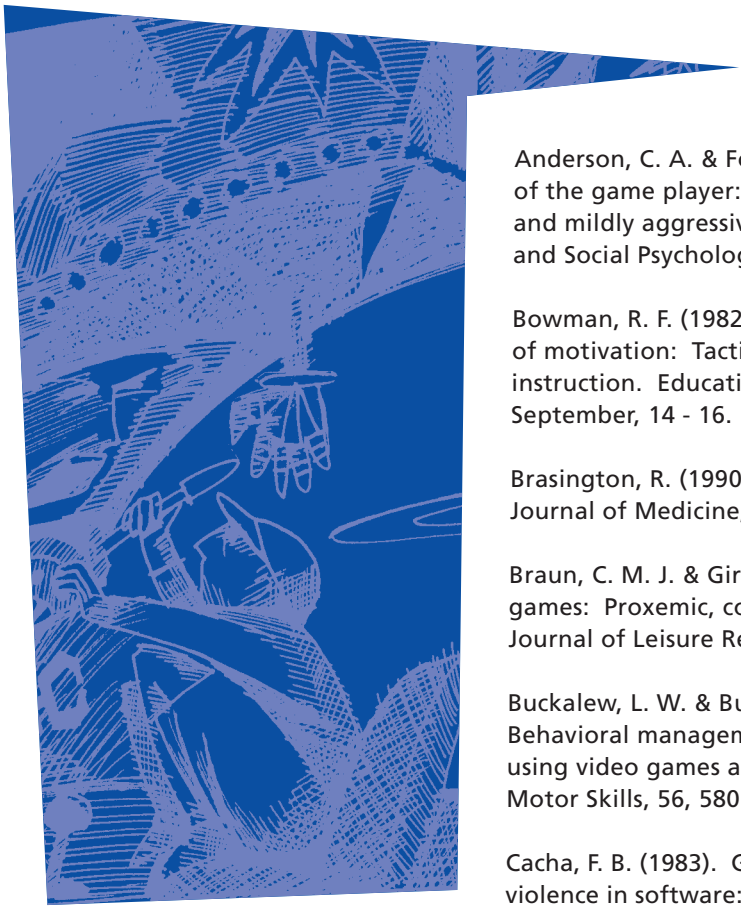

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