

AROUSAL MECHANISMS, ATTENTION AND SPORTS PERFORMANCE

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**THIS THESIS IS DEDICATED TO
THE MEMORY OF MY MOTHER
WINIFRED KERR**

ABSTRACT

This thesis is concerned with the relationship between arousal mechanisms, attentional processes and competitive sports performance.

Theoretical interpretations of the arousal-performance relationship have traditionally followed the inverted-U hypothesis. Based on this approach, the generally accepted view in sports psychology is that high levels of arousal are detrimental to good performance. A review of the relevant psychological literature reveals the limited nature of such an approach and draws attention to alternative perspectives such as those offered by the work of Apter and that of Cox and Mackay. These more recent theoretical approaches allow more sophisticated interpretations of the individual's experience of arousal to be realised. Important here are other aspects of the individual's psychological state (cognition and emotion) as these are thought to affect his or her interpretation of arousal. Interestingly, the two theories, developed independently by Apter and by Cox and Mackay, appear consistent, one with the other, and have not previously been applied to the study of competitive sport.

Several different research techniques were incorporated into a research design which used squash players of varying levels of ability to examine the various psychological factors important in their experience of and performance in competitive squash. The research techniques, some of which were innovative, proved effective in identifying the interaction of arousal and stress in relation to competitive performance.

It was concluded that psychological preparation and experience (i.e. number of years, number of times per week played), along with personality characteristics and attentional strategies, contribute to

success in competitive squash. Fluctuations in emotional responses characterised players whose performance was unsuccessful. By way of contrast, successful players' (i.e. successful in terms of level of ability attained, skill performance and winning games) psychological responses were more consistent. They achieved and maintained high levels of arousal both prior to and during performance. High arousal was, for successful players, accompanied by low stress and positive hedonic tone when they were subject to the demands of competitive squash games.

Overall, successful players (that is skilled players in Study 2 and winners from Study 3) were highly extravert and significantly less neurotic (Eysenck) than other groups of players. Telic dominance was not a discriminating characteristic in this investigation, but successful players' attentional styles were significantly different, as defined by Nideffer's BIT and INFP subscales, to those styles or strategies employed by less capable players. Successful players generally employed psychological preparation strategies prior to and during play to a greater extent than other players. When doing so, they were more concerned with cognitive strategies, in the form of focussing and planning, than arousal modulation strategies.

The present research investigation advanced knowledge about the processes involved in competitive sports, providing new and relevant information. As a result, a number of suggestions for squash coaching and player development, along with implications for cognitive intervention with sports performers, have emerged.

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PREFACE

This thesis is concerned with the relationship between arousal mechanisms, attentional processes and competitive sports performance.

My interest in the applications of psychology to the area of sport developed from my undergraduate student days at Loughborough. Here I was able to combine a study of psychological theory with my own experiences as a first class rugby player. This combination of study and personal experience continued for some 10 years, during which time I became increasingly unhappy with the way sports psychology, particularly the "accepted" explanations of the effects of arousal, was being used to interpret behaviour in sport. My interest eventually became professional, and I was able to embark on this investigation, which arose from a need to demonstrate that, contrary to widely held opinion in sports psychology and the arguments of optimal arousal theory, high arousal can be a positive and pleasant experience in sport.

Chapter 1 reviews the literature which relates such psychological concepts as arousal, attention, stress and personality to the psychological processes involved in performance and competitive sport. For those involved in the study of what has become known as sports psychology, the concept of arousal is one of central importance. A traditional view of the arousal concept, the inverted-U relationship and optimal arousal theory, is presented initially and then, in view of limitations associated with this approach, two alternative, independent but consistent approaches to the understanding of arousal are presented. These are the orthogonal model of stress and arousal (Cox, 1978; Mackay et al., 1978) and reversal theory (Apter, 1982). A central feature of both these approaches is the importance of subjective interpretation of arousal by the individual. Based on these two

theoretical approaches, implications for cognitive intervention strategies in sport are explored (Kerr, 1987a). Claims that increases in level of arousal cause attentional narrowing (Easterbrook, 1959; Nideffer, 1976) are then addressed in a discussion of theoretical views of the relationship between arousal and attention. Towards the end of the chapter, previous research work which has examined personality and sport is reviewed. Of importance in this review is the proposition of Eysenck, Nias and Cox (1982), which suggested that better sports performers score high on extraversion and low on neuroticism scales. Finally, the small number of research studies which have focussed on squash, the context in which sports performance was examined in this thesis, are discussed. Only a few of these studies dealt with psychological aspects of squash, and then in a rather haphazard and unsystematic fashion. As a result of these considerations, the research reported in this thesis focussed on the psychological state of players and their interpretation of arousal prior to and during competitive squash.

In Chapter 2, discussion initially centres on the advantages and disadvantages of "field" as opposed to "laboratory-type" research in sports psychology. The conclusion reached was that the best features of both types of research could be maintained by incorporating simulations into the research design. Secondly, the research methodology adopted in this thesis is described. The strategy involved the use of a number of different research techniques to examine psychological aspects of squash performance. Questionnaire survey, "laboratory type" study and simulations were incorporated into the research design. Squash players of differing abilities were the subjects in these studies, and special interest focussed on their ongoing mood reactions during performance and developing play. A description of the psychological measures used with this end in mind, along with information about reliability and previous use, are also included in this chapter.

The study reviewed in Chapter 3 investigated the psychological preparation of squash players before competitive play. "Skilled", "average" and "novice" Canadian and British squash players completed a

questionnaire specially designed to explore their psychological state before and during play, in particular those aspects which were deliberately controlled or planned by players. Differences were found in the psychological strategies used by novice players when compared with skilled and average players, before and during competition. In particular, the study attempted to draw out the salience of "arousal inducing" compared to "arousal reducing" or "calming" strategies. It was concluded that the use of arousal reducing techniques was generally not appropriate in squash.

Extending the analysis provided by Chapter 3, Chapter 4 describes an experimental analysis of squash performance. A relatively controlled experimental environment was set up in the familiar surroundings of a squash court. The reactions of skilled, average and novice players to manipulations of task difficulty were measured under game-like conditions. Again, differences between the ability groups were found with respect to personality, attentional style and self-reported mood as well as performance.

Players' psychological reactions under competitive tournament conditions were a central feature of the third study, discussed in Chapter 5. Simulations characterised by high ecological validity, that is all the "normal" features of competition, were used as a means of drawing out the complexities of individual behaviour in competitive sport. Differences in psychological states and responses between successful ("winners") and unsuccessful players ("losers") were obtained. As players progressed through the tournament, losing games produced greater variations in mood than winning did. In addition, differences in attentional strategies and personality traits which corresponded with the findings from the previous study were found.

Chapter 6, the final chapter, presents the overall discussion of findings and conclusions which are discussed in the light of Cox and Mackay's (Cox, 1978; Mackay et al., 1978) and Apter's (1982) theoretical approaches, described in Chapter 1. It was concluded that successful players can be differentiated from other groups of players

in terms of their personalities, their psychological preparation prior to games and the attentional strategies they use during play. It was also concluded that successful players were either less affected by, or more resistant to emotional responses during competition than less successful players. Successful players achieved and maintained high arousal levels which were experienced as non-stressful. In view of these conclusions, this research has implications for theoretical interpretations in sports psychology, and for squash coaches involved with the development of players at different levels within the game of squash.

John H. Kerr

May 1988

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CHAPTER 1

REVIEW OF LITERATURE

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CHAPTER 1**REVIEW OF LITERATURE**

INTRODUCTION

This review of literature is an attempt to gather together and evaluate the relevant research literature concerned with arousal, attention, personality and, to a lesser extent, anxiety and stress. Of particular concern is the relevance of such material to the understanding of the psychological processes involved in competitive sport. Greater attention has been paid to some areas of the literature than to others, thus sacrificing a comprehensive account of all the possible areas of knowledge that might contribute to what is known to be of importance to, for example, motivation and performance. Perhaps, therefore, a word of caution is appropriate, as many of the psychological topics referred to are complex and any review runs the risk of presenting an over-simplified view of the processes involved.

Firstly, literature dealing with the concept of arousal is reviewed. Research evidence from a number of different fields is presented in a comparison of a traditional view of the arousal concept with two relatively new alternative approaches to its understanding. Following this, and based on these new interpretations, some theoretical implications for cognitive intervention strategies, used for affecting arousal levels prior to and during sports performance, are explained. The next section draws out the theoretical connection between arousal and attention, explored through an examination of research studies dealing with performance under dangerous and other conditions. Leading on from this section is a review of those studies which have investigated the personality characteristics of sports populations. Finally, before the summary, a few relevant research studies dealing with the game of squash are covered.

THE INVERTED-U HYPOTHESIS AND OPTIMAL AROUSAL THEORY

The inverted-U relationship was first identified by Yerkes and Dodson (1908) using rats and mice in laboratory experiments. They found that there was a curvilinear relationship (inverted-U shape) between motivational level (arousal) and performance. The well-known psychophysiological work of Lindsley (1951), Hebb (1955), Duffy (1957) and Malmo (1957), although individually different, did much to establish the notion of optimal levels of activation (arousal) for performance. Later, following on from drive theory (see e.g. Hebb, 1955), the inverted-U hypothesis became the basis for optimal arousal theory, (e.g. Broadhurst, 1959; Malmo, 1959; Fiske & Maddi, 1961; Duffy, 1962; Berlyne, 1967). The underlying premise of this theoretical view was that, up to a certain point (the "optimal" point), the performance level of the subject improved as the arousal level increased. Any further increase in arousal once this point had been reached would result in a deterioration of performance. Consequently, a graph of performance against arousal would take on an inverted-U shape, as shown in Fig. 1 below.

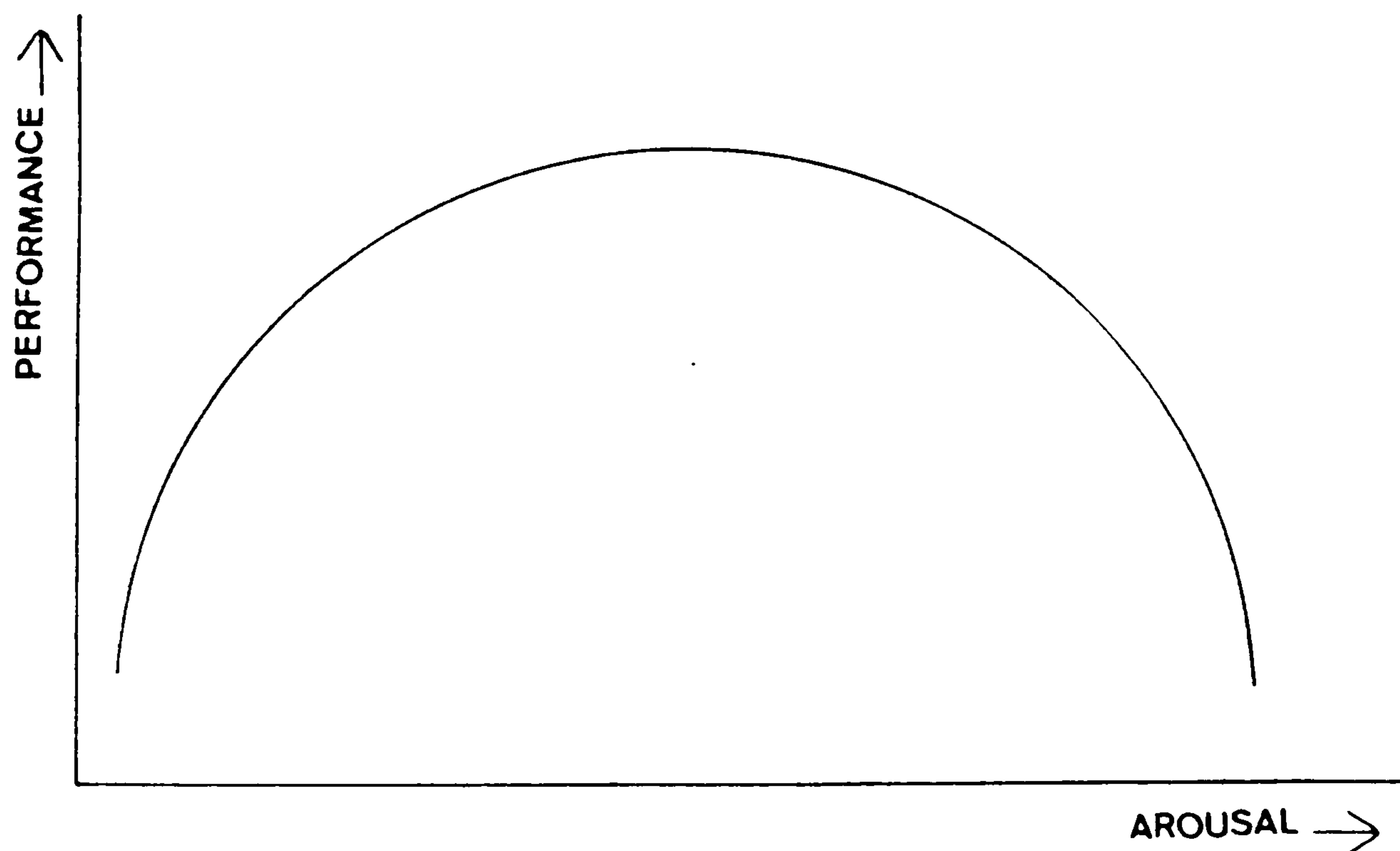


FIG. 1. Relationship of level of performance to level of arousal according to the inverted-U hypothesis.

In addition, the nature of the task was recognised as an important consideration, with low levels of arousal thought to be more conducive for difficult tasks than for simple ones (Corcoran, 1965). The inverted-U hypothesis/optimal arousal approach is based on a uni-dimensional conceptualisation of arousal, an approach which was questioned by, for example, Lacey (1967), who claimed that the evidence pointed to behavioural, autonomic and cortical components of arousal. More recently, factor analysis of the results of empirical work which incorporated self-reported arousal (e.g. Thayer, 1967; 1978) indicated that arousal was more complex than the optimal arousal theory uni-dimensional view. Self-reported arousal and the work of Thayer are returned to later in this review.

Optimal arousal and sports performance

Where optimal arousal theory has been applied to sport, the main consideration has been the so-called optimal point, thought to be the point of interaction between arousal and performance which was most conducive to high-level sports performance and the point at which performance was maximised. As a result, the reader often finds Oxendine's (1970) rather simple generalisations about the level of arousal required for different motor tasks quoted in the sports psychology literature. He stated that:

- "(1) A high level of arousal is essential for optimal performance in gross motor activities involving strength, endurance and speed.
- (2) A high level of arousal interferes with performance involving complex skills, fine muscle movements, coordination, steadiness and general concentration.
- (3) A slightly above average level of arousal is preferable to a normal or subnormal arousal state for all motor tasks."

In line with the optimal arousal theory approach, much of the research work which has examined arousal effects in sport (see e.g. Landers, 1978; Rushall, 1979; Landers & Boutcher, 1986 for reviews) has been restricted by this uni-dimensional view of arousal. The general consensus has been that if arousal levels are too high or too low, in order to maximise performance, arousal must be increased or decreased to some "intermediate", optimal level. Martens (1974) stated:

"Greater physical energy requirements combined with increasing task difficulty reduce the range of optimal arousal even further. High energy requirements with high task difficulty are the precise task conditions that exist in many well known sports such as tennis, basketball and wrestling. Thus, because these activities have such a narrow range for optimal performance, it is easy to understand why it is so difficult to achieve and maintain an optimal arousal level when performing these tasks."

An example is provided by a field research study undertaken by Klavora (1978). Canadian senior high school basketball players (n=145) were the subjects of the study. The arousal levels of players prior to games were measured using the State-Trait Anxiety Inventory developed by Spielberger, Gorsuch and Lushene (1970). In addition, subjective evaluations of each player's performance in relation to the player's performance ability were provided by the coach after the game. For most players, scores were obtained on these two dimensions for a minimum of eight and maximum of fourteen occasions. When the players' arousal levels prior to the game were plotted graphically against their basketball performance scores, bell-shaped curves supporting the inverted-U relationship were obtained. Klavora claims that players were found to be performing poorly because they were either under or over-aroused, a finding which is not unusual in studies of this type. The position of the "bell-shape" along the pre-game arousal axis was found to vary and two distinct groups were found. This led to Klavora to conclude, based on the inverted-U hypothesis paradigm, that both groups required additional arousal prior to games, albeit to a different degree. Klavora also claimed to be able to identify a "customary level of arousal", recognisable as a range of scores on an arousal continuum for each athlete.

However, Klavora's research, along with most similar studies of sport, still provided little detailed information about the form or nature of the interaction between arousal and performance during competitive sport. In addition, a common feature of this type of research has been the use of measures of anxiety to measure high arousal. Arguments are presented in the following sections which draw attention to the erroneous assumptions associated with this practice.

Limitations of the optimal arousal theory approach

Optimal arousal theory has a number of theoretical limitations which have been highlighted both by psychologists concerned with sport and those working in other areas of psychology. Baddeley (1972) stated:

"One of its major weaknesses as a theory is its ability to account for almost any result so long as the exact location on the U-curve is not specified in advance." (p. 542).

It becomes very difficult to disprove the hypothesis and many authors are guilty of "manipulating" the theory to fit in with experimental findings. There have been few studies which have convincingly demonstrated the inverted-U relationship; most have produced findings that relate to either ascending or descending parts of the curve so that "the inverted-U relationship is more of a post hoc explanation than a hypothesis" (Martens, 1974). Naatanen (1973) provided a critical review of the inverted-U hypothesis which showed that performance decrements were caused by particular features of experimental designs, a criticism supported by Cooke (1981). Welford (1976) was also concerned about the limitations of the inverted-U relationship and posed a number of questions:

"While the model seems accurate as far as it goes, it does not advance our understanding very much. Where for instance does the optimal point come? Why does it seem to differ from one task to another? Does performance beyond the optimum point merely revert to what it was before the optimum was

reached, or are the imperfections different above and below the optimum." (p. 131)

Murgatroyd (1985, p. 3) has pointed out that the homeostatic nature of optimal arousal theory has been subject to criticism. He has listed a number of psychologists, including Maslow (1954), Buhler (1959) and Frankl (1969), along with Harlow (1953) and Allport (1960), who are at odds with the basic premise of the homeostatic construct and its use in the attempt to provide a satisfactory explanation of motivation. Apter (1982, p. 86) has also questioned the ability of the theory to distinguish between four nouns: "anxiety", "excitement", "boredom" and "relaxation", which are reflections of pleasant, unpleasant, and high and low arousal. The possibility of low or high arousal being experienced as pleasant by individuals under certain circumstances is not easily encompassed within the optimal arousal theory approach. Explanations which have suggested that excitement is a reflection of moderately high arousal whilst very high arousal is reflected in feelings of anxiety (e.g. Hebb, 1955) are not compatible with experience, since feelings of excitement would always have to be experienced before an individual could become anxious. Finally, optimal arousal theory seems unable to account for the pleasant feelings individuals experience during risk-taking behaviour. In, for example, dangerous sports such as parachuting, mountaineering and motor-racing, intrinsic high levels of arousal are experienced as pleasurable by the participants (Kerr, 1985a; in press-a).

There would appear to be two possible approaches to overcoming the problems of a uni-dimensional concept of arousal. One approach would be to develop multi-dimensional models contrasting behavioural, psychological and physiological aspects of arousal. This approach is problematic in that it tends to weaken the original concept and introduces an unnecessary set of paradoxes and complications associated with the poor correlations which have been found between psychological and physiological measures. These inherent difficulties have been discussed by Cox (1985). A second approach would be to keep the

strength of the original uni-dimensional concept of arousal but be more sophisticated by placing it in a context of other psychological states such as pleasantness or stress.

The purpose of the next section is to present two alternative theoretical views which, although developing independently and originating from different theoretical backgrounds, share some common ground and may prove to be beneficial in the understanding of arousal effects in competitive sport.

ALTERNATIVE APPROACHES TO UNDERSTANDING AROUSAL

Experimental work has already shown that the individual, depending on the circumstances, can interpret arousal in different ways. Schachter and Singer (1962) used injections of epinephrine to increase subjects' level of physiological arousal. By manipulating the environmental conditions they then found that subjects, ignorant of the effects of epinephrine, interpreted their high arousal as either euphoria or anger depending on the pertinent conditions. Levi (1967) contradicted the notion held by some researchers that adrenaline release could be related to particular emotions such as fear and anger. His findings indicated that both unpleasant and pleasant stimuli were just as likely to result in catecholamine release. More importantly, however, adrenaline release was shown to reflect the intensity of arousal, but no connection could be made between adrenaline release and particular emotional responses.

The work of Cox and his colleagues at the University of Nottingham on the study of stress, particularly in occupational settings (see e.g. Cox & Mackay, 1981), has led to the development of an orthogonal model of the relationship between stress and arousal (Cox, 1978; Mackay, Cox, Burrows & Lazzarini, 1978). The development of a self-report Stress-Arousal Checklist (SACL) using factor analysis (Mackay et al., 1978; Cox & Mackay, 1985; see Chapter 2), based on Thayer's work (1967,

1978), has provided research findings which support the idea of a stress and an arousal factor, existing as independent bipolar factors. A graphical representation of this relationship is shown in Fig. 2.

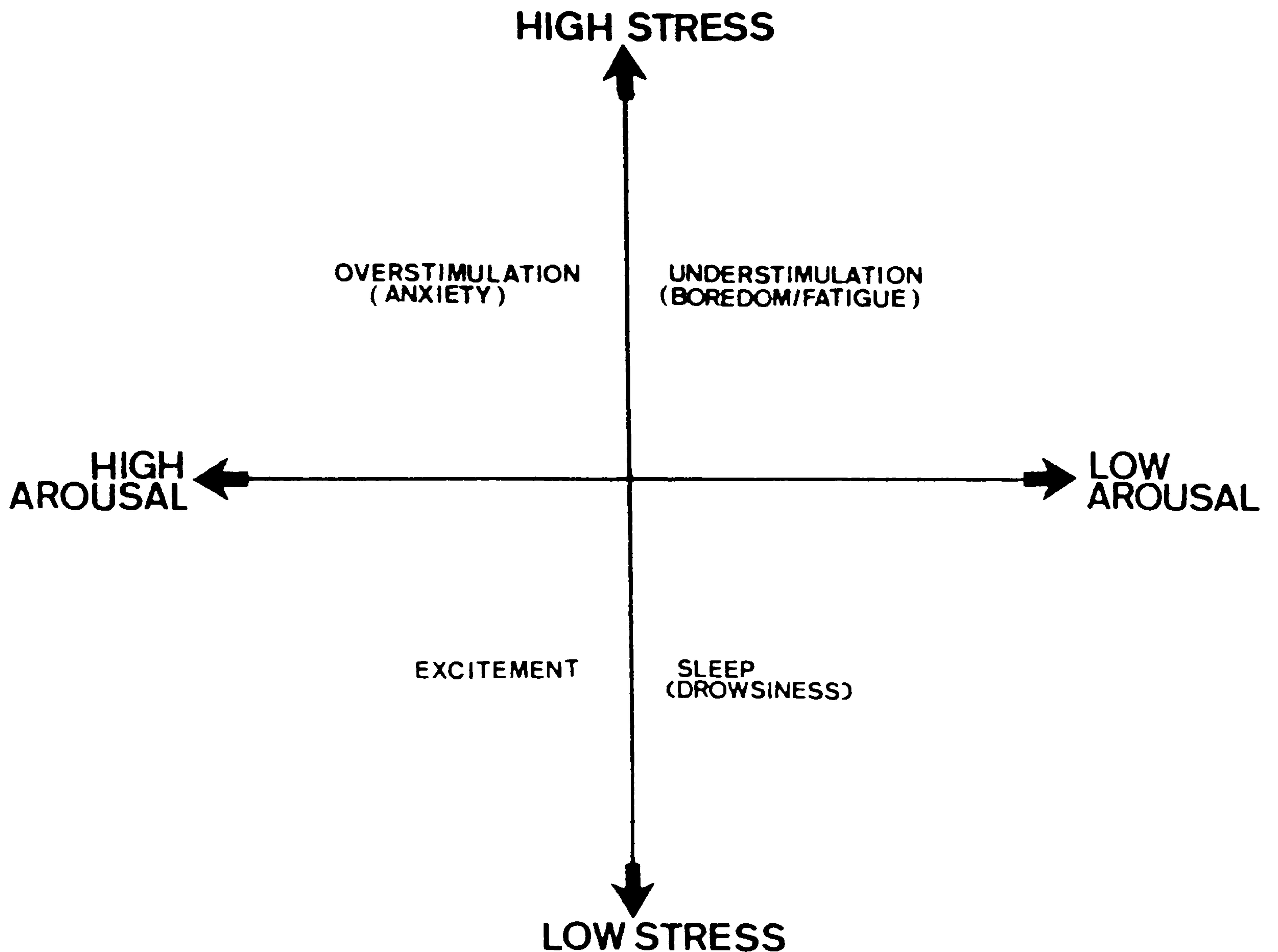


FIG. 2. Orthogonal model of arousal and stress (from Cox, 1978).

Research studies carried out over a 10-year period, in a variety of settings and using a number of different methods of measurement, have indicated the resilience of the orthogonal model over time (Cox, Mackay & Thirlaway, 1978; Cox, Thirlaway & Cox, 1982; Surawy, Stepney & Cox, 1985). The use of self-reported mood (stress and arousal) techniques allows the measurement of the individual's response to particular situations or environments. There are, of course, advantages and disadvantages associated with the use of self-report techniques (Mackay

& Cox, 1987). However, such information could, especially if used in combination with measures of performance or physiological responses, provide a more complete picture of, for example, mood changes during competitive sport.

Referring back to Fig. 2, here clearly high or low arousal can be combined with either high or low stress. Depending on the particular combination, the experience of the individual is characterised by feelings of excitement, over-stimulation (anxiety), under-stimulation (boredom) or drowsiness. Kerr (1985b) has argued that this postulated inter-relationship between stress and arousal can be linked with reversal theory (Apter, 1982) which is based on what is known in the theory as "structural phenomenology"; the provision of pattern and structure to experience. A description of some of the basic features of the theory will allow the role that arousal plays to be understood.

Arousal in reversal theory terms is defined as "the degree of motivational intensity which an individual experiences at a given time" and known as "felt arousal". (For a glossary of reversal theory terms see Appendix D). Also conceptualised within the theory are a number of "metamotivational states" which exist together as paired opposites in a bistable system with two alternative preferred states. One of the pair of phenomenological states is thought to be operative at any particular time, however, a reversal to the opposite state is always possible. Three types of inducing agents: contingent events, frustration and satiation, may trigger a reversal from the operative state to its opposite. The importance in terms of arousal can be seen if the telic-paratelic pair is examined. In the telic state, the individual prefers low arousal, is geared towards achieving goals, and behaviour tends to be future oriented. In the paratelic state, high arousal is preferred, behaviour is present-oriented and concerned with the pleasure of immediate sensation, usually of high intensity. The Telic Dominance Scale (TDS; Murgatroyd, Rushton, Apter & Ray, 1978; see Chapter 2), has been developed to measure any consistency in subjects' disposition for the telic or paratelic state over time. (A related state version of the TDS, the Telic State Measure (TSM; Svebak & Murgatroyd, 1985) has also been developed).

A graph of "hedonic tone", or experienced pleasure against felt arousal (see Fig. 3), shows how in the telic state low arousal is preferred and gives rise to pleasant relaxed feelings. High arousal in this state is usually considered unpleasant and leads to feelings of anxiety. Low arousal in the paratelic state, however, is experienced as unpleasant boredom and high arousal as pleasant feelings of excitement. Clearly there are many examples which illustrate that this interpretation is compatible with what is often experienced in everyday life.

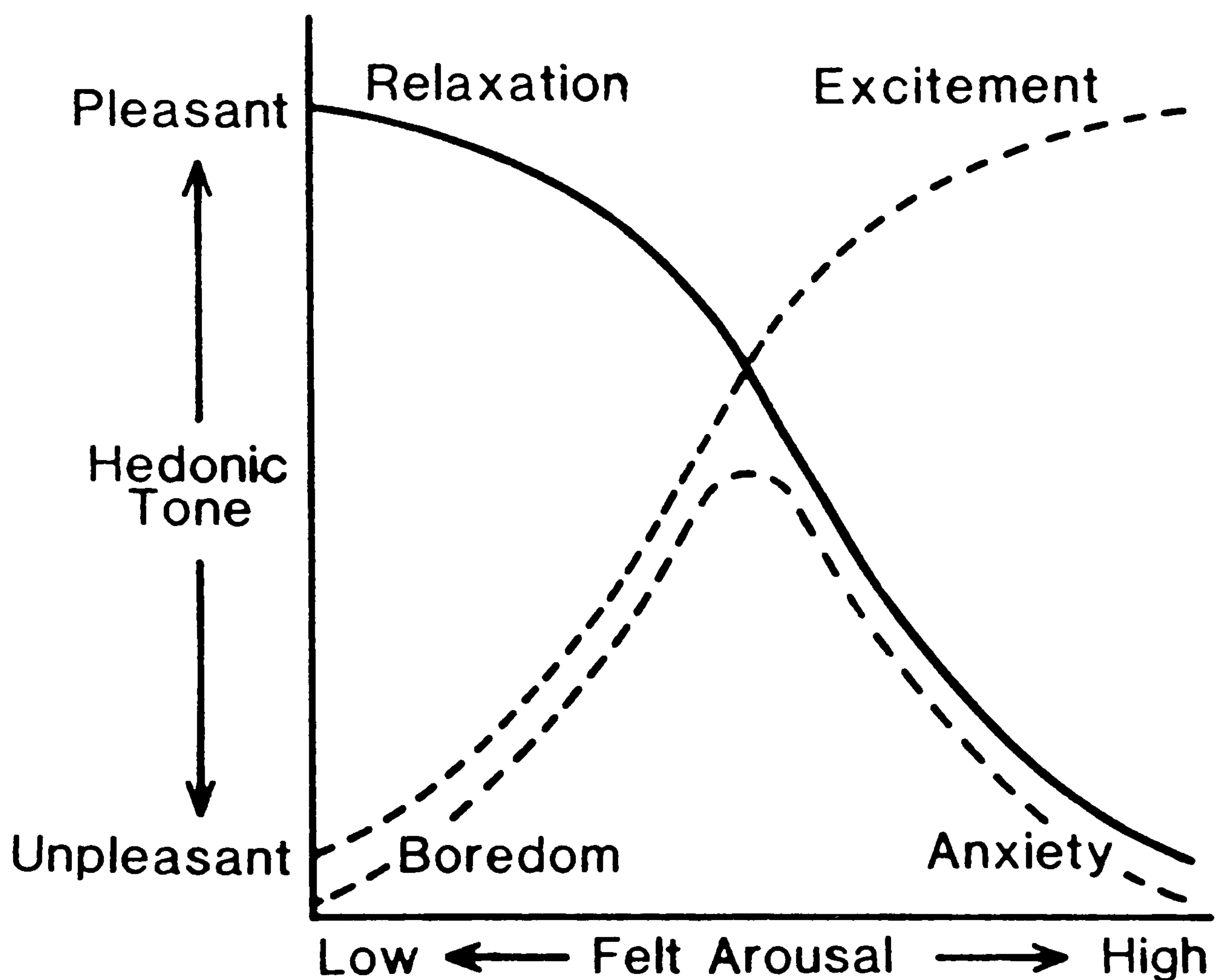


FIG. 3. The relationship between arousal and hedonic tone for the telic state (solid line) and the paratelic state (broken line). The dotted line indicates the single curve of optimal arousal theory (from Apter, 1982).

In his comparison of the inverted-U hypothesis with reversal theory, Apter (1979) argues that, depending on which state is operative, either high or low arousal can be equally pleasant to the

individual. It can be seen in Fig. 3 that the X-shape of the curve has contained in its lower half an inverted-U shape. Under the terms of reversal theory, intermediate levels of arousal would still be experienced as pleasant, and this might conceivably provide an explanation for some of the research evidence which tends to support the inverted-U relationship. In this way it could be said that reversal theory subsumes the optimal arousal theory interpretation. Cox and Mackay's approach has also identified four separate stress/arousal interactions. The sleep/drowsiness condition proposed by them may not be exactly the same as Apter's concept of low "felt arousal". Nevertheless, if the orthogonal model of arousal and stress suggested by Cox and Mackay (Cox, 1978; Mackay et al., 1978) is superimposed over the hypothetical curves representing hedonic tone and arousal (Apter, 1982) a certain similarity becomes apparent (see Fig. 4).

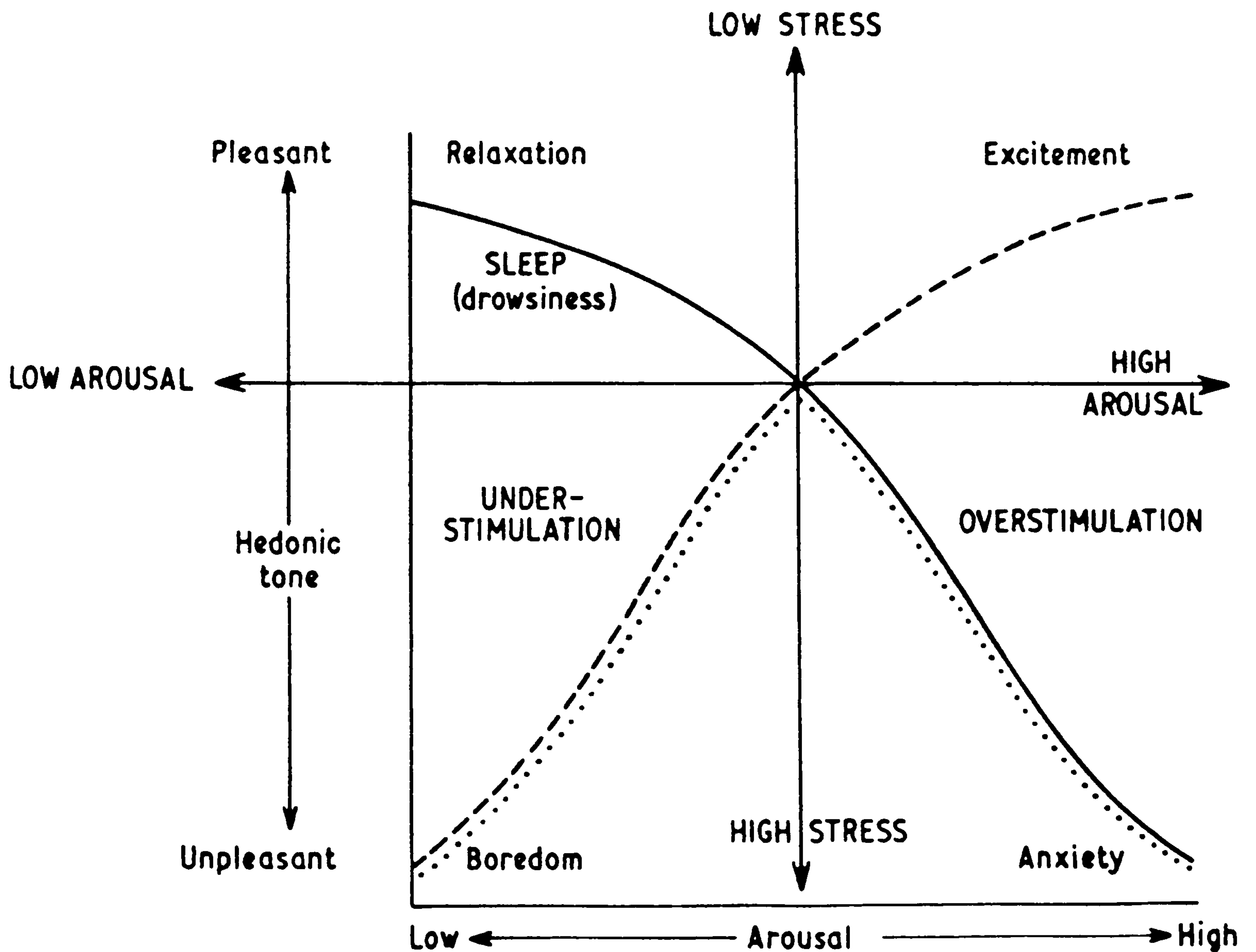


FIG. 4. Superimposing the orthogonal model of stress and arousal on the graph of hedonic tone against arousal (from Kerr, 1985b).

Perhaps the most important difference between these two approaches and optimal arousal theory is that they both allow for high levels of arousal to be interpreted in different ways depending on the hedonic tone of the individual at the time. These approaches together offer an interpretation of arousal which has to be considered in relation to other psychological states.

Other common ground between these two approaches concerns the idea of the individual expending effort to compensate for any discrepancy in level of arousal. Reversal theory distinguishes between "felt" and "preferred" arousal, where preferred arousal is the level of arousal that the individual would have preferred at any given time, rather than that which was actually experienced (see Telic State Measure, Chapter 2). A discrepancy between these two levels of arousal will lead to the individual experiencing "tension-stress" (Apter & Svebak, in press). Effort on the part of the individual to reduce the discrepancy in arousal levels, often accompanied by unpleasant negative hedonic tone, is thought to result in "effort-stress". Cox, in developing a model and methods of measurement of mood states, has also described a cognitive mechanism which contributes both to the emotional experience and the control of behaviour which is based on the discrepancy between actual levels of arousal (self-reported) and required levels (determined by internal and situational factors). A marked discrepancy between these two may lead to "compensatory" behaviour, while the threat implied by an inappropriate (actual) level of arousal and the effort of compensating contribute in turn to a negative emotional experience (self-reported stress) (Cox, Thirlaway & Cox, 1982). They state:

"It is suggested here that self-reported arousal (SACL) reflects the actual level of energy or activity within the overall psychophysiological system (arousal) as experienced by the person. It is also suggested that self-reported stress (SACL), in part, reflects the effort expended in balancing this actual level of arousal against that required for effective behaviour (activation)." (p. 125).

There would appear to be little difference between the two approaches in terms of their definitions of arousal and in their

conceptualisation of stress as described above. These ideas can be applied to the understanding of arousal effects in sport and have particular implications for the use of cognitive intervention strategies prior to or during competition. These implications are discussed in the next section.

Arousal effects and sports performance: implications for cognitive intervention

Rushall (1979) claimed that athletes rarely experience large changes in arousal levels because they develop a method of controlling activation which evolves through trial-and-error learning and experience. There is some evidence to suggest that top-level sports performers are able to adjust their activation levels according to the particular demands of the situation (Genov, 1970; Fenz & Jones, 1972; Barry, 1979). Langer (1966) has shown that, prior to competition, the level of tension is reasonably stable in proficient athletes. Vanek and Cratty (1970) pointed out that arousal levels can be increased, decreased or sustained for as long as necessary at particular levels by the better sports performers. Evidence is provided by Rushall (1977) and Barry (1979) that elite sports performers have a heightened self-awareness, enabling them to recognise the bodily sensations and feelings that concur with different arousal levels. It appears that top sports performers may be able to develop "naive" strategies for affecting arousal levels based on trial and error and the experience of what has been successful in similar predictable environments. Outside predictable environments, these naive strategies are likely to break down and lead to poorer performance. If the performers understood why the naive strategies had been successful, then it is possible that the strategies might have been adapted successfully to unpredictable environments.

Although top performers are generally thought to be able to control arousal, for some, emotional feelings may be more difficult to regulate. Kerr (1987a; in press-b) has drawn attention to the

increasing frequency of references to the use of cognitive intervention in the sports context. Intervention techniques initially developed and utilised in clinical psychology are primarily oriented towards altering the individual's level of arousal (e.g. progressive relaxation, Jacobson 1938; biofeedback, Basmajian, 1962; 1963) and are largely concerned with arousal reduction. These techniques have been advocated for use by sports performers as possible aids to adapting and coping during competition (see e.g. Bell, 1976; Blais & Orlick, 1977; Zaichkowsky, Dorsey & Mulholland, 1977; Bennett & Stothart, 1978; Layman, 1978; Tomayko, 1978; Pressman, 1979; Pulos, 1979).

Rushall (e.g. 1982) is one of those who advocates the use of "on-site" intervention techniques should it be necessary. He has formulated detailed strategies and competition-specific plans for top level sports performers based on evaluations of their behaviour, the nature of specific sports situations, and the characteristics of the sports and their participants. Rushall has included the possibility of "on-site" cognitive intervention to be implemented when the mental state of the performer was thought to be inappropriate for the demands of the particular competition environment. Obvious requirements for the success of such techniques are the necessity of prior training of the sports performer in the relevant technique and an ability on the part of the sports psychologist to recognise situations where intervention is appropriate. Many of the reports of the use of these techniques in this context are positively biased and, as Mahoney (1984, p. 14-15) and Heyman (1984, p. 269) have both pointed out, caution is required until further research has been carried out.

An enduring theme, undoubtedly the outcome of optimal arousal theory, is the notion of over-arousal, the idea that the individual performer's level of arousal becomes so high that it interferes negatively with performance. Reducing arousal, however, may not always be an appropriate strategy to use. Research reported by Heide and Borkovec (1983) and Budzinski, Stoyva and Peffer (1980) has shown that some subjects are unable to achieve a state of low arousal and that, for others, relaxation training can paradoxically induce anxiety (see

also Smith, 1985). More recently, there are some researchers and authors (e.g. Railo, 1982; Stallings, 1982; Caudill, Weinberg & Jackson, 1983; Mahoney, 1984; Garfield & Bennett, 1984) who have recognised the importance for some sports performers of achieving high levels of arousal prior to and during competition.

In attempting to provide a theoretical background which would support such recognition, Kerr (1987a; in press-b) argues, from a reversal theory viewpoint, that there are three other equally effective intervention possibilities for affecting arousal levels in sport. The four possible strategies are illustrated in Fig. 5.

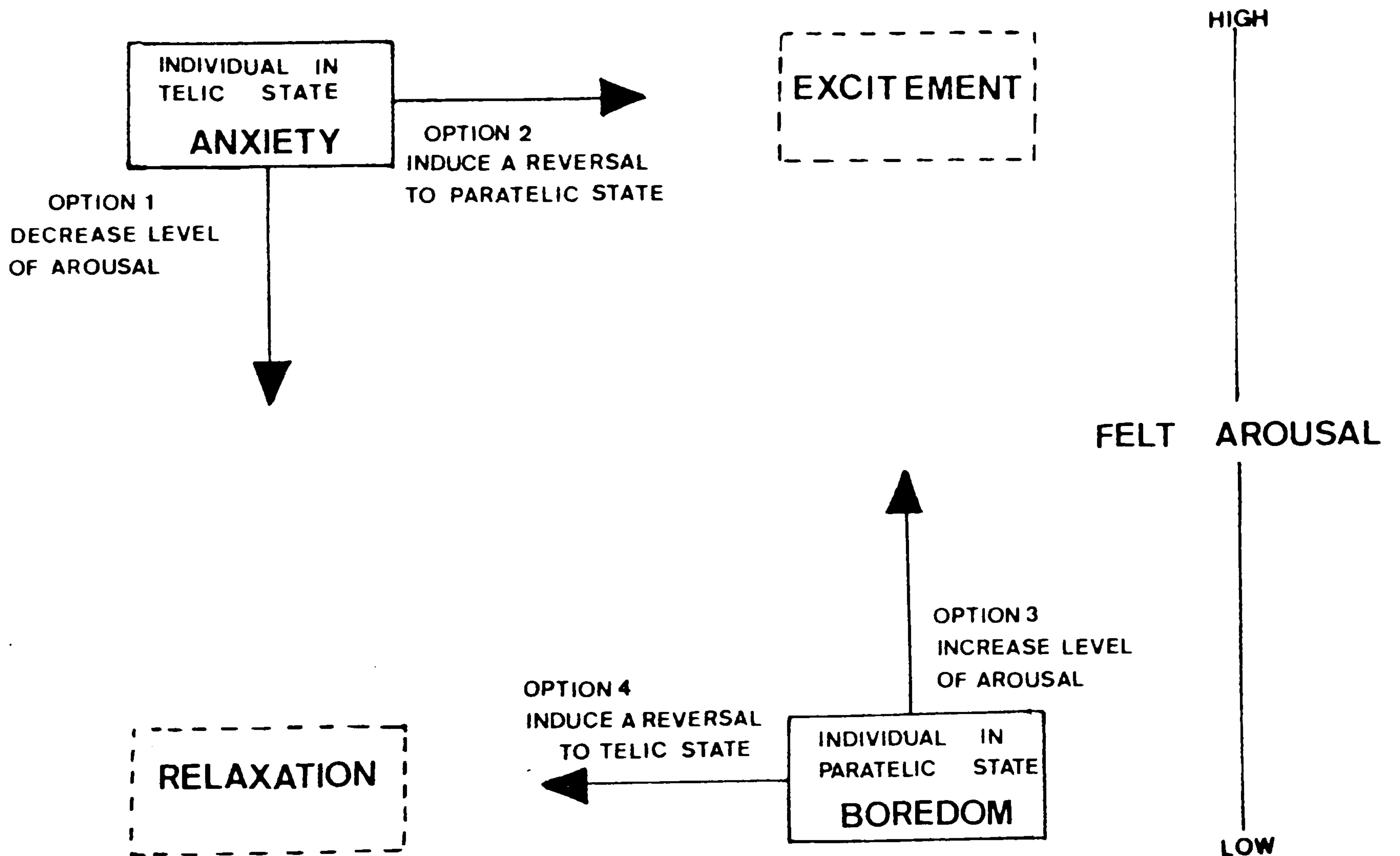


FIG. 5. Possible options for affecting felt arousal (from Kerr, 1987a; in press-b).

Arousal reduction (1) would be appropriate for the individual in the telic state, resulting in unpleasant feelings of anxiety being

changed to pleasant feelings of relaxation. For the individual in the paratelic state, where low levels of arousal are experienced as unpleasant boredom, an increase in arousal (3) is required, to a level which would then be experienced by the individual as excitement. Svebak and Stoyva (1980) have suggested that this might be achieved by, for example, using biofeedback to teach subjects to voluntarily increase arousal rather than the opposite. Inducing reversals (2 & 4) would result in a reinterpretation of arousal, as perceived by the individual, thus changing hedonic tone.

Equally, if Cox and Mackay's (Cox, 1978; Mackay et al., 1978) model of arousal and stress, where the feelings experienced by the individual are dependent on the interaction between arousal and stress, is considered, then similar possibilities for affecting the level of arousal and its interpretation exist.

This moderation of arousal level or reinterpretation of arousal by induced reversal leads back to Duffy's (1962) concept of level of energy and the degree of accompanying pleasant or unpleasant feelings. It does not, however, deal with sports performance in terms of content and strategy. These elements of performance should be considered because they may be dependent on level of arousal through the concepts of alertness and effort.

ATTENTION, AROUSAL AND PERFORMANCE

Posner and Boies (1971) have underlined the central or key components fundamental to the study of human attention. These are (a) alertness, (b) the ability to select information, (c) limitations on the central processing capacity. Little progress since the early ideas of William James (1890) was made until the appearance of Welford's (1952) single channel hypothesis, followed by Broadbent's filter theory in 1958. Deutsch and Deutsch (1963) decided that Broadbent's limited concentration channel was positioned further along in the information processing stages, and processed incoming signals relatively

automatically. Treisman (1964) followed relatively quickly with an approach that also accommodated the processing of unattended information. Rather than the complete rejection of stimuli at the "bottleneck", Treisman (1964) argued that attenuation took place, allowing all incoming signals to pass through the limited concentration channel in a weakened form. Attenuation was thought to involve the analysis of incoming information on a hierarchical basis. The findings of experiments carried out by Cherry (1953) on the now well-known "cocktail party phenomenon" provided some support for these ideas. The differences between the theories of Deutsch and Deutsch (1963) and Treisman (1964) led to a whole series of experiments which have been comprehensively described and evaluated by Eysenck (1982).

Norman (1969) and Keele (1973) made later valuable contributions. In particular, Norman's more flexible model permitted the parallel processing of incoming information. Selection was thought to take place on the basis of "pertinence" with the performer choosing, prior to the task and on the basis of past experience, those cues which were thought to be most relevant to the performance of the task. In addition, all input information was subject to a sensory analysis which, depending on threshold values or relative importance, automatically activated stored representations in memory. Kahneman (1973) introduced the idea of attention and effort. He suggested that, within the limits of capacity, parallel processing could take place throughout information processing. Cognitive assessment of task demands largely controls the proportion of capacity or effort accorded to a particular task. Capacity was seen as variable and could change in response to differing demands. This view of capacity or effort as variable was, of course, in conflict with previous theories in which capacity was regarded as fixed. Some theorists have taken their ideas a stage further and proposed that information processing itself may be flexible.

The interaction of automatic processes and conscious attention was examined by Posner and Snyder (1975a and b). The results obtained provided some foundation for the authors' two predictions that performance is facilitated by activation of memory by the priming

stimulus, and that decision-making would be speeded up when an expected event occurred by the reactions of conscious attention to the probabilities of expected events. Unexpected events were thought to require an additional shift and therefore additional time. In a second experiment, Posner and Snyder's (1975a) hypothesis focussed on the proposed improvement in the speed of operation of automatic activation with practice. Again their results supported their theoretical predictions. The outcome of this work was the development of a conceptual difference in the meaning of the terms "automatic process" and "conscious attention". Posner and Snyder (1975a and b) proposed that automatic processes should occur without intention, should not give rise to any conscious awareness, and should not interfere with any other ongoing mental activity.

In general, these different approaches have explained the influence of arousal on attention in terms of the inverted-U hypothesis. Moderate levels of arousal have been considered most conducive to attentional demands during performance. Often quoted in this respect is a paper by Easterbrook (1959) (see also Teichner, 1968), where he argued that increases in emotional arousal produce greater attentional selectivity and reduce the range of cue utilisation. Eysenck (1982) summarised the situation:

"The beneficial effects of moderate arousal are primarily attributable to increased attentional selectivity, which leads to a greater proportion of the available processing resources being allocated to task performance. In addition, the natural speed of processing is enhanced as arousal increases above its resting level, and there may be an increase in total attentional capacity. The detrimental effects of high arousal largely revolve around a reduced ability to engage in shared or parallel processing. High arousal also leads to increased distractibility to both external and internal informational sources and an impaired ability to make perceptual discriminations. Finally but more speculatively, high arousal may reduce attentional capacity." (p. 177).

Attention and arousal under dangerous conditions

Weltman and Egstrom (1967), using novice divers, found that the ability to monitor a faint peripheral light whilst performing a central task was affected when the task was performed under high arousal conditions during diving. Baddeley and his colleagues, in a series of experiments which examined manual dexterity during diving (Baddeley, 1966; Baddeley & Fleming, 1967; Baddeley, De Figueredo, Hawkeswell-Curtis & Williams, 1968; Davis & Osbourne, 1970), found that performance deteriorated as the depth of dive and level of anxiety, dependent on the apparent risk involved, increased. In a more elaborate experiment, in which anxiety responses were measured, Weltman, Smith and Egstrom (1971) again found that detection of peripheral information deteriorated, but performance on the central task remained the same. The results of these experiments suggested that in dangerous situations attention becomes more narrowly focussed on that aspect of the situation that is of greatest immediate importance. Baddeley (1972) goes on to discuss how some individuals with experience can adapt themselves to dangerous environments. An often-quoted study in an ongoing series by Epstein and Fenz (1965) on parachutists has produced results which corroborate the idea of experience and adaptation to danger. Novice and experienced parachutists were compared on self-rating reports and physiological measures at a number of stages during the parachute jump. As the jump approached, culminating with the ready signal, novice jumpers became increasingly more and more adverse to jumping. For the experienced jumpers; feelings of maximum aversion to jumping were apparent on the morning of the jump and on landing. As the jump approached, contrary to the novices, their enthusiasm and eagerness to jump increased. According to Epstein and Fenz (1965), the experienced jumpers learn to inhibit anxiety since it tends to inhibit performance.

Most of the material reviewed in the section above has supported the idea of increases in arousal bringing about a narrowing of attention, with a resultant detrimental effect on performance. Yet some of the Epstein and Fenz (1965) findings suggest that this may always be

the case. Kerr (1985a; in press-a) has reviewed the anecdotal observations of some top level sportsmen proficient in high risk sporting activities (e.g. mountaineering, motor sports) where attentional factors are crucial to their survival. For them the intrinsic high arousal associated with such activities was reported as being experienced as pleasant and constituting an essential element in their continuing participation and high level performance.

There is, however, some evidence from other non-sports literature (Kerr, 1987b) which would appear to indicate that unpleasant high arousal (anxiety) can be beneficial to performance. In an experiment investigating visual angle (Schmidt, 1964), subjects were required to distinguish peripheral cues. The Taylor Manifest Anxiety Scale (Taylor, 1953) was used as a measure of trait anxiety. Subjects who recorded high scores on the scale revealed a broader reporting of stimuli than those with low levels of trait anxiety. Similar results were obtained by Solso, Johnson and Schatz (1968) which indicated an increased range of perception of stimuli with highly trait-anxious subjects. Again the Taylor scale was used and the task in this experiment involved a broad stimulus layout, from which subjects had to pick out as many stimuli as possible. Cornsweet's (1969) findings, supported by Landers (1978) and Sarason (1980), showed that when peripheral cues were relevant to the central task, the threat of shock increased the extent to which they were used. Research work by Mendelson and Griswold (1967) found that moderately anxious males were most restricted with respect to utilisation of task-relevant peripheral cues; a curvilinear relationship was found between trait anxiety and the range of task relevant peripheral cues utilised. They have suggested that, given peripheral cues which are relevant to the central task, increasing levels of anxiety cause a narrowing of the attentional range up to a certain point, beyond which further increases produce a wider range. Also, with reference to incidental learning:

"The assumption that under certain conditions anxiety may produce a broadened range of cue utilization also helps clarify an otherwise confusing state of the data on the relationship between anxiety and incidental learning. Taking into account the Easterbrook hypothesis only, one would have

to predict that high levels of anxiety would be associated with relatively poor incidental learning, because utilization of cues necessary to such learning would be hampered". (Geen, 1980, p. 48).

Dusek, Mergler and Kermis (1975) and Dusek, Kermis and Mergler (1976), in two research studies examining trait anxiety on intentional and incidental learning, have found rather different results. Children who scored high on anxiety were found to be inferior in learning the central task but superior in terms of learning the incidental stimuli. Here the performance of high test-anxious subjects on the central task is not unusual in that increased anxiety is thought to produce task irrelevant responses. However, the superior performance in incidental learning by the same group of subjects conflicts with Easterbrook's (1959) position. An analogy used by Watchel (1967) may be helpful in the interpretation of these results: attention was compared to a beam of light which may be broad and diffuse, or conversely rather more narrow and focussed. Watchel's analogy goes further than Easterbrook's notion, where the breadth or narrowness of attentional focussing was considered to be related to the individual's level of arousal, and described how the "beam" might be limited to a small range or might scan a much wider area. Increases in arousal were assumed to have a dual role, bringing about increases in the range of scanning and causing the focus of attention on particular points of the field to become narrowed. Furthermore, Teichner (1968) argued that searching or scanning was dependent on attention, which in turn was dependent on activation (arousal). This led to the assumption that band width was inversely related to activation, with increases in activation resulting in decreases in band width and therefore increases in attentional processing speed and searching behaviour.

The results of these anxiety studies provided some evidence that high arousal could be beneficial to performance. There are of course other, more general exceptions to the idea that low levels of arousal are always associated with broad attention and high levels of arousal with a narrowing of attention. Arousal reduction techniques, such as meditation or progressive relaxation (Jacobson, 1938) or yoga-type

techniques like transcendental meditation, are associated with a narrow range of attention. In spite of inconsistencies in the interaction between arousal and attentional factors in performance, the utilisation of peripheral cues and incidental stimuli are an obvious concern of the sports performer. This is especially true for racquet sports such as squash where these factors could be crucial to good performance. Consequently, experimental investigations which examine the use of peripheral cues, incidental stimuli and attentional range with corresponding changes in arousal are important.

One approach developed by Nideffer (1976) has generated interest among sports psychologists. It has attempted to measure such attentional differences using a paper and pencil test; the Test of Attentional and Interpersonal Style (TAIS).

Attentional and interpersonal style

The theoretical foundation of Nideffer's (1976, 1981) work is based on the two-dimensional approach to attention, comprising both breadth and direction of focus (Easterbrook, 1959; Watchel, 1967). This notion has been coupled with the idea that individuals can direct their attention either internally or externally (Heilbrun, 1972; Shakow, 1962), allowing Nideffer to produce a graphical representation of what he terms "attentional styles".

Individuals are thought to maintain a balance between narrow and broadly focussed attention and internally or externally oriented attention, shifting from one to another. Incorporated within this approach are certain basic assumptions which Nideffer (1981) makes explicit:

- "(1) There are several attentional dimensions that are related to effective performance including width and direction of attentional focus.
- (2) Attentional processes can be thought of as having both state and trait components.

- (3) The ability to control attention, and to shift from one attentional focus to another, is related to arousal.
- (4) Individuals tend to have preferred attentional styles. There are individual differences in attentional abilities and each of us has our own relative attentional strengths and weaknesses."

These interpretations led to the development of the Test of Attentional and Interpersonal Style (TAIS) by Nideffer (1976; see Chapter 2) to measure attentional and interpersonal characteristics involved in performance. Nideffer (1981) extended his ideas and the use of his test to performance in sporting activities. A two-dimensional graphical representation of "attentional style", described in terms of width and direction, is shown in Fig. 6.

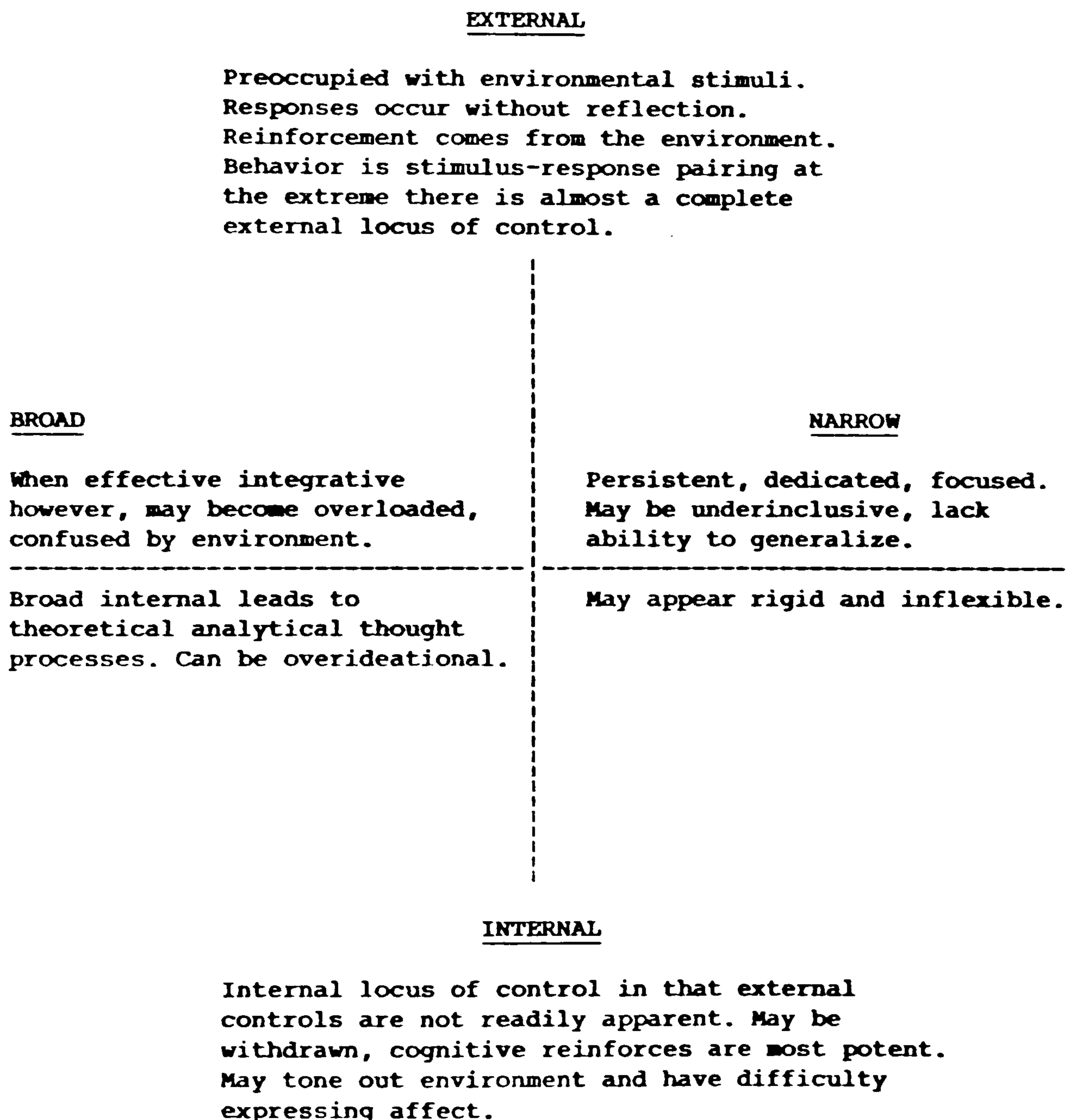


FIG. 6. Theoretical consequences of particular attentional styles (from Nideffer, 1976).

Nideffer (1981) claims that, in complex and rapidly changing sports situations, it is likely that performers would need to be able to shift both the width and direction of attentional focus. Performers who could do this in a controlled and voluntary manner, rather than be subject to uncontrolled shifts or the inability to shift attention, were considered to have an advantage with respect to performance. Furthermore, increases in arousal were thought to interfere with the ability of the sports performer to shift attentional focus and also to result in an involuntary narrowing of attention.

Sports-based research which has examined the predictive ability of the Nideffer test has produced ambiguous results. Landers and Courtet (1979), for example, obtained more accurate performance scores from shooters who reported being able to effectively integrate ideas and information from many different areas, as measured by the broad internal attentional focus subscale. Again in a study of shooting, Landers, Furst and Daniels (1981) found attentional differences (broad external and broad internal attentional focus) between skeet/trap (open skill) shooters and rifle/pistol (closed skill) shooters. Using a very small sample of 9 subjects, Kirschenbaum and Bale (1980) correlated mean golf score and each of the seventeen TAIS subscales. Coefficients for four subscales: overloaded by external stimuli, broad internal attentional focus, reduced attentional focus, obsessive, were reported as surpassing the $p < 0.05$ level of significance.

Generally, some support has been found for the broad-narrow breadth of attention dimension and for identifying those sports performers who become "overloaded" by stimuli and reduce attention too much. More problematic is Nideffer's claim that the internal-external direction of attention can be predicted. Indeed, the current test items appear to be more concerned with "band width" than with the internal-external source of information. According to Van Schoyck and Grasha (1981), following a TAIS study involving 90 tennis players as subjects, a multi-dimensional view of band width, consisting of both a scanning and a focussing component, was preferable to Nideffer's broad-narrow concept.

The Test of Attentional and Interpersonal Style, in addition to subscales concerned with attentional ability, does have a number of subscales which measure personality variables. The subject of personality and performance in sport has been one that has been the focus of some research activity. The findings from this research activity are relevant to this investigation and are reviewed in the following section.

PERSONALITY AND SPORTS POPULATIONS

Research began as early as the 1930's and 40's (e.g. Cowell, 1935; Carter & Shannon, 1940; Sperling, 1942). Although some research studies, especially in the United States, were undertaken using the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1951) for example, it was with the development of the Eysenck Personality Inventory (EPI; Eysenck, 1964) and later the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975), along with Cattell's 16 Personality Factor Questionnaire (Cattell, Eber & Tatzucka, 1970) that real interest began.

Of interest to the present investigation are previous research studies which have examined the personality characteristics of sports populations using the EPI and EPQ. Personality scores for 152 physical education students were listed among the data from 46 occupational groups presented in Eysenck and Eysenck (1975). Apart from two other small occupational groups, mean extraversion scores were the highest, while neuroticism scores were close to the average and psychoticism slightly below average for these students, when compared with other groups equivalent in age. In a similar unpublished study (cited in Eysenck, Nias & Cox, 1982, p. 12), 118 first-year physical education students produced average scores on neuroticism but scored much higher than average on extraversion. Brooke (1967) had obtained similar results. A further group of 39 British athletes had similar scores, i.e. average for neuroticism but above average for extraversion. Knapp (1965) studied Wimbledon-standard tennis players. Mean scores again

showed higher extraversion and average neuroticism scores for this group when compared with the general population.

In another unpublished study, Olympic athletes (n=192) who completed the EPQ scored significantly higher on extraversion, lower on neuroticism and higher on psychoticism than 500 control subjects, (cited in Eysenck, Nias & Cox, 1982, p. 10). The subjects in this study came from a variety of different sports, but there is some other evidence which indicates that sport performers from different sports (e.g. Kane, 1966), or even within different disciplines of the same sport (e.g. Coleman, 1979), differ in personality. Coleman (1979) examined personality using the EPI in relation to different types of shooting sports involving a variety of skills. For example, trap shooting involves hitting a moving target on a trajectory while the free pistol event allows the competitor more time to concentrate on precision shooting. Extraversion scores seemed to be related to the degree of difficulty of the event, the number of factors to be controlled, and possible decisions to be made. The rapid-fire pistol group, who must rapidly move the pistol between targets under very tight time restrictions, were found to be the most extraverted group.

Although there are many methodological problems associated with research work examining the relationship between personality in sport, several of which are underlined by Eysenck, Nias and Cox (1982), they have identified a number of reasonably well-supported conclusions. The most important of these in the present context are that sportsmen and sportswomen tend to be extraverted, and that outstanding sports performers score low on neuroticism. The relationship between psychoticism and performance or success in sport is much less clear.

In the light of the evidence summarised above, and the tentative conclusions arising from previous studies which incorporated the EPI or EPQ in the study of personality and sport, it seemed worth including such measures in the present research investigation, especially as the extraversion-introversion dimension has been linked to variations in levels of chronic arousability. Introverted subjects have been shown to

have higher levels of chronic arousal when compared to extraverted subjects. As a result of this, introverts have been shown to be better performers, for example under monotonous conditions where arousal tends to decrease (see Welford, 1976, p. 137).

Unfortunately, despite studies on personality, other research which has concentrated on psychology and sport, although growing each year, could by no means be said to be substantial. Little research has focussed on the psychological processes invoked during competitive sport and even less has involved the game of squash, the subject of this research. This may be due in part to the relatively recent growth of squash as a popular sport available to all classes of people. Those research studies which have investigated squash are reviewed in the next section.

PREVIOUS RESEARCH ON SQUASH

An examination of the relevant sports literature revealed little research concerned with psychological aspects of squash performance. For example, a computer-based search using the Dialog system, listed some 2,444 studies on performance and arousal and 8,778 on performance and attention. None of these, however, focussed on squash. Using the keywords "stress", "motivation", "personality", "training" and "performance", 131,665 studies were identified, but only 157 remained when the keywords "squash", "badminton", "tennis", "racket" and "racquet" were used. A combination of these groups of keywords produced 76 studies. Only two studies were connected with squash. Forgas, Brennan, Howe, Kane and Sweet (1980) examined audience effects on squash performance, while Dowd and Innes (1981), using Cattell's 16PF test (Cattell, Eber & Tatzucka, 1970), compared the personality profiles of top with regular but low ability squash and volleyball players. The results indicated that more skillful players were more intelligent, less anxious, more experimenting, more conscientious and less controlled than the less skillful players. Although there were few differences between the two sports, volleyball players were found to be slightly less anxious than squash players.

A small number of other studies concentrating on physiological and biomechanical aspects of squash (Winter, Fairley & Kidd, 1986; Constaninides & Montgomery, 1986; Chapman & Zuyderhoff, 1986), were discovered from other sources. In addition, Hughes (1984), based on earlier work by Sanderson and Way (1977), developed a method of notational analysis for squash using a microcomputer. Hughes (1986) reports the use of this system in the analysis of play at different levels of competitive squash. Using recreational, county and nationally-ranked players, the analysis showed that recreational players were not accurate enough in their shots to sustain a tactical plan, hitting more winners and making more errors than the other players. County players showed a greater variety in the range of shots they played during matches and utilised a simple tactical strategy, keeping the ball deep and predominantly on their opponent's backhand side. Their shots were significantly less accurate than the nationally-ranked players, but significantly more accurate than the recreational players. Nationally-ranked players were found to utilise more complex tactics in an "all court-game" which incorporated better stroke technique and covering ability due to their superior fitness. Rallies lasted longer during play between the nationally-ranked players, with the service proving less crucial at this level than at recreational and county level where rallies were shorter.

Only a few of these additional studies were concerned with psychological aspects of performance in squash. Bright and Sanderson (1986) utilised questionnaire and discrete observation techniques to investigate attitudes towards sportsmanship amongst 26 male squash players involved in competitive league squash. The results indicated that sportsmanship and vulnerability were inversely related, suggesting that poor sportsmanship may be connected with emotional lability. In addition, players were found to regularly and intentionally use severe negative behaviours on the court, some of which violated the current squash rules.

Spray and Ashford (1987) examined age and sex differences in participation motives in squash players. Questionnaire responses were

obtained from female (n=36) and male (n=103) players at a private squash club in Essex. Health and fitness, competition and esteem received more emphasis from males than females, who were more concerned with affiliation, power and the actual game. Also, while players aged over 25 emphasised the importance of fitness, affiliation and competition, younger players reported excellence, skill development and independence as motives for participation.

Two case studies of stress inoculation training (see Meichenbaum, 1977) for controlling anxiety in squash were reported by Mace and Carroll (1986). After preliminary interviews, the male and female squash players concerned each completed state anxiety questionnaires (Spielberger, Gorsuch & Lushene, 1970) just before five important league or team matches, in order that baseline levels of anxiety could be established. Following eight training sessions, this procedure was repeated and baseline levels of anxiety were found to be reduced. Although improved performance was also reported by the players, it cannot be concluded that this was a direct outcome of the stress inoculation training. An additional methodological problem was the small number of subjects on which the stress inoculation training was carried out.

Of more direct relevance to this research was a study undertaken by Sanderson and Gilchrist (1982), who examined the anxiety and attributional responses of competitive squash players. The results indicated that there was no relationship between pre-match anxiety and performance, although the post-match anxiety scores of winners fell significantly ($p < 0.001$). By way of contrast, losers' post-match anxiety increased significantly ($p < 0.05$). In addition, winners were found to attribute significantly more internally ($p < 0.001$) and significantly less externally ($p < 0.001$) than losers, although internal attributions were still considered to be the most important determinant of match outcome by losers.

It is clear that the growing popularity of squash as a racquet sport and the relatively recent dates of the small amount of research

work that has been carried out reflect a developing interest in this area. It was the intention of this research to add to this recent development by examining psychological factors affecting performance in squash. Although some psychological studies have been carried out in, it would appear, a rather unsystematic or even haphazard manner, this investigation attempted a more systematic interpretation of arousal within a broader framework of psychological states.

SUMMARY

This chapter has reviewed the relevant literature on arousal in the context of sports performance. An attempt was made to highlight the methodological problems which beset much of the research and the problems associated with a uni-dimensional view of arousal. The more sophisticated approaches of Cox and Mackay (Cox, 1978; Mackay et al., 1978) and Apter (1982) have been summarised with the intention of providing an acceptable alternative to optimal arousal theory and a theoretical base for this investigation. The nature of the area under study, sports performance, necessitated the inclusion of a section dealing with notions of attention in order that its role during performance could be evaluated. Those studies concerned with personality as another possible influence on successful performance, along with studies concentrating on squash, were reviewed in the final sections of this chapter.

AIMS OF THIS THESIS

General aims

This thesis set out to investigate the psychological factors associated with playing competitive sport. More specifically, it was concerned with arousal effects in competitive squash and the interaction of these effects with performance.

Specific aims

- (1) To investigate the psychological preparation of squash players, particularly their cognitive and emotional states and behaviour before and during competition.
- (2) To determine the role of cognition and mood with particular reference to arousal and attention in the performance of squash tasks.
- (3) To examine individual differences, beyond playing ability, using personality and ability questionnaires.
- (4) To determine the role of level of playing ability on the factors described in (1-3) above.
- (5) To investigate possible differences, in psychological responses, between successful ("winners") and unsuccessful players ("losers") during competitive play in a squash tournament.

Finally, a major overall aim of this thesis was to infer which psychological processes underlie success in competitive squash, thus providing the possibility of making recommendations to those interested in improving performance in other competitive sports settings.

CHAPTER 2

METHODOLOGY

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CHAPTER 2**METHODOLOGY**

INTRODUCTION

This chapter on methodology focusses on the empirical aspects of the research investigation. In order to gather accurate information about the psychological processes involved in competitive squash, several different research techniques were utilised. These comprised, firstly, a questionnaire survey which examined psychological preparation for competitive squash, secondly, a "laboratory type" study of a squash practice task and, thirdly, field research in the form of three simulated squash tournaments. In all three cases, the enquiry focussed on the nature of the players' psychological state, particularly their mood reactions. An overview is presented in Table 1. In addition, this chapter contains sections which provide a discussion of research strategy, a description of the subjects involved and details of the measures used in the studies.

RESEARCH STRATEGY

In general, sports psychology research has been conducted either "in the field", examining uncontrolled complex sports situations, or in the laboratory, involving tightly-controlled, detailed analysis of abstracted sports tasks. Taken individually, there are problems and advantages in both approaches. For example, laboratory studies have tended to be more accurate in terms of methodology than field studies, which some observers argue address more interesting and relevant problems. There are, however, three important interacting dimensions which require consideration in sports psychology research. Firstly, does the research study concern questions which are ecologically valid,

TABLE 1. Showing an overview of research strategy.

RESEARCH TECHNIQUE	SUBJECTS	PSYCHOLOGICAL MEASURE(S)	DESIGN CHARACTERISTICS
<u>STUDY 1 (CHAPTER 3)</u>			
QUESTIONNAIRE SURVEY	N=64 CANADIAN & BRITISH SKILLED, AVERAGE & NOVICE PLAYERS	-SQUASH QUESTIONNAIRE	CORRELATIONAL STUDY WITH CROSS-TABULATIONS
<u>STUDY 2 (CHAPTER 4)</u>			
"LABORATORY-TYPE" SQUASH PERFORMANCE TASK	N=40 SKILLED, AVERAGE & NOVICE PLAYERS	-EYSENCK PERSONALITY INVENTORY -TEST OF ATTENTIONAL & INTERPERSONAL STYLE -TELIC DOMINANCE SCALE -STRESS-AROUSAL CHECKLIST -TELIC STATE MEASURE	ANOVA DESIGN WITH BETWEEN AND WITHIN SUBJECT FACTORS
<u>STUDY 3 (CHAPTER 5)</u>			
SIMULATED TOURNAMENT 1	N=10 NOTTINGHAM CLUB PLAYERS	-EYSENCK PERSONALITY QUESTIONNAIRE -TEST OF ATTENTIONAL & INTERPERSONAL STYLE	ANOVA DESIGN WITH BETWEEN AND WITHIN SUBJECT FACTORS
SIMULATED TOURNAMENT 2	N=10 NORTH MIDLANDS COUNTY PLAYERS	-TELIC DOMINANCE SCALE -STRESS-AROUSAL CHECKLIST -TELIC STATE MEASURE	
SIMULATED TOURNAMENT 3	N=10 ENGLISH UNDER-19 SQUAD PLAYERS		

dealing with the whole activity in context, or is it concerned with the study of some abstracted part of sports tasks? Secondly, is the study being conducted under natural conditions in the field or under artificial laboratory conditions elsewhere? Finally, is the methodology adopted in the field or laboratory adequate?

Whiting (1972) has suggested that a useful interaction should exist between the two different types of study, while Glencross (1978) has urged that distinctions between theoretical study, laboratory investigation and the solution of problems at the practical level should be strongly avoided. Martens (1979), in a long discussion of the problem, draws attention to the weaknesses of the traditional types of study, and goes on to argue that the real future for sports psychology lies in applied field research; that is, importing experimental techniques into situations which have an "ecological" validity. Glencross (1978) suggests that those who are involved with the study of psychology and sport should endeavour to:

- "(1) study issues, questions and variables that are situationally significant and purposeful and not because they are convenient or easily manageable;
- (2) study such questions and issues in close relation to the natural environment in which the sportsman performs and achieves;
- (3) devise procedures, techniques and methods that are suitable for the investigation of complex interacting variables that characterise the sporting context;
- (4) select procedures which relate to highly skilled subjects in complex situations and avoid the use of inexperienced subjects exposed to novel and artificial tasks." (p. XII)

In the light of arguments presented above the following research strategy was devised. The first stage was correlational study in field conditions which examined the psychological preparation of squash

players prior to competitive play. Subjects who had previously agreed to take part in the study were approached at their sporting venue after playing and asked to complete a specially designed squash questionnaire. While such an approach may be judged inadequate in terms of hypothesis testing, it often represents the first stage of scientific inquiry.

The second stage in research strategy was an experimental analysis of squash performance. Squash players were required to perform skills in familiar, realistic surroundings, but at the same time, because of the enclosed nature of a squash court, the conditions under which they did so could be relatively tightly controlled. This scenario could, for example, provide a context in which task difficulty might be manipulated and its effects studied. In this way, the advantages of laboratory and field studies could be maximised while the disadvantages of both could be minimised.

While this study had made a useful beginning, an even better understanding of the psychological processes in competitive squash could be obtained by taking the research methodology one step further and studying players' reactions under competitive tournament conditions. This was the theme of the third stage in research strategy, where simulated squash tournaments were specially set up to permit players' psychological reactions to be monitored under "natural", but nevertheless controlled conditions. Having carried out the two more extreme options in the questionnaire survey and "laboratory-type" study of the squash task, the third part of this investigation was an attempt to find a more ecologically valid environment for measurement, probably positioned in the middle ground of the "field-laboratory continuum". Every attempt was made to avoid the pitfalls that are sometimes associated with simulation research and to ensure that, in this example of applied field research, the simulations encompassed all the "normal" features of competition.

The issue of validity in simulated field research is not just limited to sports psychology. For example, Monahan and Loftus (1982), researchers concerned with the psychology of law, examined the use of simulations to study jury decision-making and concluded that many of them lacked realistic or valid representations of the actual jury process. Somewhat earlier, Bem and Lord (1979, p. 841) stated that the external, or ecological, validity of simulation research in any area of psychology requires that "the relationships between situational variables and the behavior in the (simulated) setting replicate the relationships between situational variables and the behavior outside the laboratory". An interesting paper by Tunnell (1977) argued that there were three dimensions of naturalness which had been selectively emphasised or neglected by field researchers. These three dimensions were (1) natural behaviour, (2) natural setting, and (3) natural treatment. Tunnell (1977) claimed that if all three were used simultaneously, the outcome of field research studies would be much richer.

Given the reservations outlined above, especially Tunnell's (1977) concern for naturalness in simulation research, it seems worth considering the validity of the squash tournament simulations. As far as natural setting and natural treatment were concerned, the tournaments, organised, presented and managed by a third party, were held both in familiar squash surroundings and under normal competitive conditions (e.g. tournament play was controlled by experienced "markers"). The subjects taking part were independently recruited high-level squash players (skilled club, county and national under-19 level players) who believed they were playing in a "real" squash tournament. The subjects played against opponents of similar ability and, as is usual in such tournaments, cash prizes were awarded to the tournament finalists, with all players receiving travelling expenses.

With respect to natural behaviour, the post-tournament observations of the organisers and markers suggested that players were involved and committed. This was also reflected in the obvious ongoing

signs of trying hard, competitiveness, and elation and disappointment. The feedback from players during debriefing indicated that their reactions to the event were positive and that they had enjoyed taking part. It was generally agreed by peers in each tournament that the appropriate people had won, suggesting that the natural outcome was realistic rather than distorted. Some players mentioned that American scoring was unusual in tournaments, but it is otherwise well known in squash.

In terms of the three dimensions of naturalness outlined by Tunnell (1977), it was thought that the simulated squash tournaments had a high level of ecological validity and came very close to the "real" situation, with the impact of the experiment being only minimal. It was also clear that the points outlined by Glencross (1978) in connection with future sports psychology research, mentioned above, were well satisfied in the simulated squash tournament.

In regard to the overall research strategy, it was felt that the inclusion of questionnaire survey methods and a study of the psychological processes involved in performing squash tasks allowed an accurate picture of psychological aspects of competitive squash play to be pieced together.

SUBJECTS

All the subjects in the three study areas of the investigation were volunteer male squash players and, with the exception of the first study where samples of British and Canadian squash players were compared, were all of British nationality. The subsequent findings of the Spray and Ashford (1987) study, which showed that males and females differed in their motives for participation in squash, suggested that restricting study to males only was prudent.

In an attempt to "tease out" differences in psychological functioning that might be apparent at varying levels of playing ability, squash players covering a broad spectrum of playing ability were deliberately included as subjects in the research studies. Players ranged from novices and beginners to highly skilled and experienced county and England under-19 players.

There were no significant differences in age between the various groups of squash players, with the exception of the third study. Here, as might be expected, the members of the English national under-19 squad were significantly younger ($F_{2,27}=5.51$ $p=0.009$), than the club and county players in the same study.

Where subjects were subdivided into ability groups, expert opinion from experienced squash coaches, with personal knowledge of the respective players, was sought to assist the experimenters in this task. In the first two studies, for example, groups of players classified as "novice", "average" and "skilled" were chosen at random from larger populations of squash players. In the third study, players were specially recruited by independent squash experts. In this latter case, subjects volunteered to play in a specially-arranged squash tournament against subjects of similar playing ability. Three separate tournaments involved players competing in Nottingham city club squash leagues, in county teams in the North Midlands area, and players involved in practice and competition as members of the English national under-19 squad.

PSYCHOLOGICAL MEASURES OF PERSONALITY, ATTENTIONAL STYLE AND MOOD

In order to build up psychological profiles of the various sample groups of squash players taking part in this investigation, a number of different psychological inventories, questionnaires and checklists were utilised. These measures were used in combination to provide information about enduring personality characteristics, psychological

preparation for squash and the more dynamic situation-specific changes in mood response which might take place during the performance of squash tasks or competitive tournament play. These are first listed and then described:

- Specially designed squash questionnaire;
- Eysenck Personality Inventory (EPI; Eysenck, 1964);
- Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975);
- Test of Attentional and Interpersonal Style (TAIS; Nideffer, 1976);
- Telic Dominance Scale (TDS; Murgatroyd et al., 1978);
- Telic State Measure (TSM; Svebak & Murgatroyd, 1985);
- Stress-Arousal Checklist (SACL; Mackay et al., 1978; Cox & Mackay, 1985).

(1) Squash questionnaire

In the absence of any other suitable measure, a questionnaire was specially designed to elicit information about the cognitive and emotional states and the behaviour of squash players before and during squash competition. It was thought that differences in psychological preparation might exist between players of varying levels of ability. In particular, the questionnaire attempted to draw out the salience of "arousal-inducing" compared to "relaxation" or "calming" techniques. The questionnaire was constructed in a manner which allowed descriptive comments and opinions to be recorded as well as players' responses to closed, pre-coded questions. The items on the questionnaire (see Appendix B.1), finalised after scrutiny by two squash coaches, were designed to provide information about: (1) subject characteristics, e.g. age, time playing squash, etc., (2) the subjects' assessment of their own ability, (3) the subjects' pre-game anxiety states, (4) the use of pre-game psychological preparation, and (5) the frequency, nature and effect of any such preparation.

Reliability study

The reliability of the questionnaire as a means of recording players' experience of the game was tested in a separate study. A sample of 20 British squash players was given the questionnaire to complete on two occasions some three months apart. Data from five of the first six questions, concerned with players' background and pre-match state, were considered in some detail as a test of the questionnaire's reliability. Responses to the other questions were also subject to examination.

The first variable was age, which was used as a simple check of reporting accuracy. Complete data were available from 19 of the 20 respondents who were county players from the North Midlands and players from the England under-19 squad. The players' mean age, on the first occasion, was 22.8 years (SD=5.7).

The data from three variables were standardised (age, length of time playing squash, and number of symptoms of anxiety), and then test-retest coefficients were calculated using Pearson's product moment correlation. The coefficients were 1.00 (age), 0.99 (length of time playing) and 0.64 (reported anxiety symptoms). A test-retest correlation was also computed for one further measure (frequency of play: 1.00) using Spearman's rank order coefficient. The other variables (level of skill and the presence or absence of pre-match mental preparation) were examined using a frequency breakdown of responses on first completion against responses on second completion. For both variables, 17 of the total 19 responses were identical. Due to the nature of these distributions, analyses using the Chi square statistic were neither possible nor necessary. Thus, where test-retest coefficients could be calculated, they proved acceptable (from 0.64 to 1.00). Where they could not, there was agreement on 17 out of 19 responses over the two sessions.

In addition, as shown in Table 2, a high level of test-retest agreement was obtained on the remaining questions (9-13), with the exception of question 12 which examined subjects' opinions about playing ability being related to how much players are "psyched up".

For most questions, the level of agreement was between 78-89%. Most of the inconsistency recorded reflected the effects of two players changing their responses to question 6 ("Before playing a game of squash do you attempt to prepare yourself mentally?"), which then determined whether they had to complete questions 7 to 13. Question 12 was less reliable than the other questions, and data from that question was ignored in the main study.

TABLE 2. Showing the consistency of subjects' responses on questions 4-13.

QUESTION NO.	CONSISTENT RESPONSES AGREEMENT	PERCENT
4	17/19	89
6	17/19	89
8	15/18	83
9	14/18	82
10	15/18	83
11	14/18	78
12	10/18	56
13	16/18	89

- (2) Eysenck Personality Inventory (EPI; Eysenck, 1964);
Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975)

Eysenck's work originally incorporated two broad personality dimensions, extraversion and neuroticism, to which a third, the normal-psychotic dimension, was later added.

The Eysenck measures of personality, the Eysenck Personality Inventory (EPI; Eysenck, 1964) and the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975), have been widely used in personality testing in psychology. As a result, a substantial literature, both theoretical and experimental, now exists (e.g. Eysenck, 1967; 1970; 1973; 1981; Eysenck & Eysenck, 1985). As well-established measures of personality, and in view of the previous work carried out on sports populations (see Chapter 1), it seemed wise to include them in this investigation. In addition, the finding that introverted individuals exhibit higher levels of chronic arousability than extroverts provided further justification for their inclusion.

Due to the widespread use of, and general familiarity with the Eysenck personality measures it is not necessary to provide more than a brief description here. Appendices B.2 and B.3 contain complete versions of the two measures.

(3) Test of Attentional and Interpersonal Style (TAIS; Nideffer, 1976)

The Test of Attentional and Interpersonal Style (TAIS; Nideffer, 1976, as shown in Appendix B.4) has been used increasingly to provide information about sports populations (e.g. Landers & Courtet, 1979; Landers, Furst & Daniels, 1981; Van Schoyck & Grasha, 1981). It has also been used to measure the individual's ability in a number of contexts where attentional and interpersonal factors are important for effective performance (see Nideffer, 1977).

The test consists of 17 subscales grouped together into three main areas: (a) attentional style (BET, OET, BIT, OIT NAR, RED); (b) behaviour and cognitive control (INFP, BCON); and (c) interpersonal style (CON, SES, P/O, OBS, EXT, INT, IEX, NAE, PAE). (Note: For the purposes of this thesis, the INFP subscale, although classified by Nideffer under the "control" subscales, is so obviously connected to attentional aspects of functioning that it has been included in the

attentional scales data). In answer to each of the 144 statements, subjects are given a 5-choice response to indicate whether the statement applies to them never, rarely, sometimes, frequently, or always. A response of "never" usually receives a score of 0 and a response of "always" a score of 4. For some items scoring is reversed. The Test subscales are described below:

- BET (Broad external attention): High scores on this scale are obtained by individuals who describe themselves as being able to effectively integrate many environmental stimuli at one time.
- OET (External overload): The higher the score the more mistakes due to being confused and overloaded by environmental information.
- BIT (Broad internal attentional focus): High scorers see themselves as effectively integrating ideas and information from several different areas, as being analytical.
- OIT (Internal overload): The higher the score, the more mistakes individuals make because they think about too many things at once.
- NAR (Narrow attention): The higher the score, the more effective individuals describe themselves in terms of ability to narrow attention (e.g. to study or read a book).
- RED (Reduced attention): A high score indicates individuals make mistakes because they narrow attention too much, failing to include all of the task-relevant information.
- INFP (Information processing): High scorers think a lot and process a great deal of information.
- BCON (Behaviour control): A high score indicates a tendency to be impulsive and/or to engage in behaviour that could be considered anti-social.
- CON (Control): A high score indicates the individual sees him/herself as being in, and needing, control over most interpersonal situations.
- SES (Self-esteem): The higher the score, the more positive the self-image.
- P/O (Physical orientation): High scores indicate the person participated in, and enjoys, competitive athletics and physical activity.

- OBS (Obsessive): High scores indicate a tendency to ruminate and worry about one particular thing without any resolution or movement. This scale provides an indication of the person's speed of decision making.
- EXT (Extroversion): Individuals who score high are warm, outgoing, need to be with other people, and tend to be the life of the party.
- INT (Introversion): High scores indicate the person enjoys being alone with thoughts and ideas. They have a need for personal space.
- IEX (Intellectual expression): A high score indicates the person expresses thoughts and ideas to other people.
- NAE (Negative affect expression): High scores are associated with a tendency to be confrontive, to express anger and negative feelings to others.
- PAE (Positive affect expression): A high score indicates the person expresses feelings of affection to others in both physical and verbal ways. These individuals tend to be emotionally supportive.

Of particular importance in this investigation, and consequently a reason for the test's inclusion, is the concept of attentional style, which is described as "being located simultaneously along two continuous dimensions". These are breadth of attention, comprising narrow and broad, and direction of focus, comprising internal to external. These dimensions are thought to have a special relationship with arousal (see Chapter 1). Nideffer proposes that individual performance should be affected by the individual's attentional style. In an ongoing performance situation such as squash, where processing of peripheral cues is necessary to achieve superior performance, Nideffer proposes that broad attenders should perform better than narrow attenders.

Test-retest reliability

Research has shown good test-retest reliability. For example, Wolfe and Nideffer (1974), with a sample of introductory psychology students, after a two week test-retest period, found correlations

ranging from .60 on the obsessive subscale to .93 on the physical orientation subscale and a mean correlation of .83. Other studies have also confirmed the reliability and acceptable construct validity of the TAIS (see Nideffer & Wiens, 1975; Nideffer, 1976; Nideffer, 1977; De Palma & Nideffer, 1977).

(4) Telic Dominance Scale (TDS; Murgatroyd et al., 1978)

Reversal theory is one of the two alternative theoretical approaches offered in Chapter 1 for the understanding of arousal effects in sport. In order to measure any enduring predisposition to the experience of arousal in a certain way, the Telic Dominance Scale (TDS; Murgatroyd et al., 1978) was used in this study. Each item on the 42-item questionnaire is comprised of telic, paratelic and "not sure" responses and subjects are asked to choose the alternative they would normally prefer. Within the scale are three subscales: serious-mindedness, planning orientation and arousal avoidance, each consisting of 14 items. Telic responses are awarded a score of one point and "not sure" responses score half a point. An individual's score is computed for each of the three subscales and the scores added together to obtain the overall telic dominance score. A complete version of the scale is provided in Appendix B.5.

Test-Retest Reliability

Murgatroyd (1983) reported four test-retest reliability studies with four different groups of subjects. These subject groups included:

- (1) 32 students and staff of a psychology department;
- (2) 48 part-time students aged between 17 and 35 attending a technical college;
- (3) 32 undergraduate psychology students aged 18;
- (4) 15 housewives aged between 28 and 38 attending a leisure education programme.

Time intervals between the administrations of the TDS varied between groups; the shortest time interval was 6 hours (1) and the longest 12 months (4). Pearson correlation coefficients were calculated as shown in Table 3.

TABLE 3. Test-Retest reliability studies of the TDS for differing periods of elapsed time (from Murgatroyd, 1983).

GROUP	TIME BETWEEN TESTS	N	SUB-SCALE INTER-CORRELATIONS		
			SERIOUS	PLANNER	AVOIDER
1	6 hours	32	.952*	.803*	.872*
2	6 weeks	48	.605*	.773*	.790*
3	6 months	32	.634*	.702*	.711*
4	12 months	15	.632*	.677*	.698*

* indicates correlations reaching statistical significance at $p < 0.01$ level.

The correlations were all found to be statistically significant at $p < 0.01$ level, indicating that the TDS has a high test-retest reliability, at least within the 12-month time period. Furthermore, the alpha coefficients of the subscales have been shown to be in the range .655 to .837 and are therefore satisfactory. Murgatroyd (1983) and Gallacher, Phillips and Apter (1983) have also reported satisfactory alpha coefficients.

In the studies reviewed by Murgatroyd (1983), no significant differences between male and female subjects in TDS scores were identified using t-tests. (In the present research any such differences are avoided because all subjects are male).

Little previous published work has been carried out on sports populations, but Kerr (1987c) found differences in the telic dominance characteristics of "professional", "serious amateur" and "recreational"

sports performers. Kerr and van Lienden (1987) also investigated the motivational characteristics of "masters athletes" and found them to be similar to the characteristics of the professionals in the earlier study. In a cross-cultural study, no significant differences were found in TDS subscale scores between top level rugby players from four different countries (Kerr, in press-c). In addition, Svebak and Kerr (in press) investigated impulsivity and sport preference in samples of Australian subjects. The results indicated that impulsivity and paratelic dominance are associated with subjects' preference for and participation in different types of sports.

(5) Telic State Measure (TSM; Svebak & Murgatroyd, 1985)

The Telic State Measure (TSM; Svebak & Murgatroyd, 1985), a derivative of the TDS, was designed to measure the extent to which subjects maintained their dominant state in an experimental situation. The measure is comprised of four questions which ask respondents to estimate (1) how serious or playful they felt, (2) how far they would have preferred to plan ahead or be spontaneous, (3) how aroused they felt, (4) the level of arousal which they would have preferred. Each of the four questions is followed by a six-point rating scale with defining adjectives at each end (serious-playful, preferred planned-preferred spontaneous, low arousal-high arousal, preferred low arousal-preferred high arousal). Low scores are concomitant with the telic state and high scores with the paratelic state. The fifth item, the discrepancy between preferred and actual levels of arousal, is computed by subtracting felt arousal from preferred arousal (i.e. score on item 4 minus the score on item 3) and can therefore be positive or negative. Details of the measure are provided in Appendix B.6.

The TSM has previously been used in combination with psychophysiological measures (e.g. Svebak, 1984) or structured interviews conducted blind to the TSM results (e.g. Svebak & Murgatroyd, 1985). In the present research, the TSM is used in combination with the Stress-Arousal Checklist (SACL; Mackay et al.,

1978; Cox & Mackay, 1985) to measure mood in specific situations (e.g. pre and post performance). Although Svebak and Murgatroyd (1985) pinpointed some difficulties in the use of the TSM, they claim it was effective in their multi-method approach. Whether this effectiveness will be repeated in the present research remains to be seen, and the inclusion of the measure here allowed a further test of its effectiveness to be carried out, in the sporting context.

(6) Stress-Arousal Checklist (SACL; Mackay et al., 1978; Cox & Mackay, 1985)

Thayer (1967), following factor analysis of American undergraduate student responses to a number of adjectives which described varying levels of arousal, developed one of the first instruments designed to measure self-reported arousal, or "activation". Later revision (Thayer, 1975) of this instrument, known as the Activation-Deactivation Adjective Checklist (AD-ACL), led to the addition of two adjectives to the "high activation scale", one of the four original dimensions, and another dimension, the "deactivation-sleep" factor, became bipolar.

Use of the AD-ACL in research studies with British populations (see e.g. Mackay, 1980) proved only partially successful due, it was thought, to cross-cultural difficulties in the interpretation of some of the adjectives. Mackay et al. (1978) replaced the problematic adjectives with more cultural-specific adjectives and, using a large sample of British undergraduates, they carried out both oblique and orthogonal rotation on the subsequent data. Two bipolar factors, labelled stress and arousal (rather than Thayer's four monopolar factors) were identified. The current version of this scale, the Stress-Arousal Checklist (SACL; a full version of which is provided in Appendix B.7) contains the 30 adjectives with the strongest factor loadings, shown in Table 4.

TABLE 4. Distribution of adjectives across factors (from Mackay et al., 1978).

STRESS (18)		AROUSAL (12)	
Positive (10)	Negative (8)	Positive (7)	Negative (5)
Tense	Relaxed	Active	Drowsy
Apprehensive	Restful	Energetic	Tired
Worried	Peaceful	Vigorous	Idle
Bothered	Cheerful	Alert	Sluggish
Uneasy	Contented	Lively	Sleepy
Dejected	Pleasant	Stimulated	
Nervous	Comfortable	Activated	
Distressed	Calm		
Up-tight			
Jittery			

Cox and Mackay (1985), in a paper which replied to questions raised by Cruikshank (1984) about the structure and use of the SACL, provided additional data and evidence in support of this instrument. The use of the "?" response (see Appendix B.7) as a response category with the dual purpose of covering any difficulty on the part of the respondent in understanding an adjective or any uncertainty about it accurately describing their current mood, was criticised by Cruikshank. Cox and Mackay (1985) argued that Cruikshank's criticism was invalid, but important in this context was the question, addressed by them, as to the proportion of the variance in the "?" response attributable to uncertainty and non-comprehension.

In a subsequent study reported by Cox and Mackay (1985), adult female workers (n=100) completed the checklist twice in two hours and the data was analysed to establish the frequency and repeat endorsements with which subjects marked the "?" response. The frequency of "?" response usage was found to be similar to that reported by Cruikshank (1984) (i.e. Time 1: Mean=13.6% SD=5.4; Time 2: Mean=11.7% SD=2.9). Repeat endorsements over the two-hour time period were found to be very low (Mean=4.4% SD=2.1). Sixty-two per cent of the sample did

not use repeat endorsements of any "?" category. Of those remaining, 29% used from one to four repeat endorsements, and 8% used five or more. Cox and Mackay (1985) claim that it was unlikely that a worker's understanding of the meaning of an adjective would change significantly over a two-hour time period and conclude from the findings that the contribution of non-comprehension to the "?" response category is somewhat limited, although Cox and Mackay (1985) do accept the recognised problem that, in any subject sample, some lack of understanding of the adjectives in a checklist is likely.

Details from the Cruikshank (1984) and Cox and Mackay (1985) papers are provided to illustrate that the SACL has been subject to rigorous examination. In this case, the examination took the form of a debate which may prove beneficial in drawing attention to the strengths (and possible weaknesses) of the instrument.

Test-retest reliability

Cox, Mackay and Page (1982) have shown the reliability coefficients of the SACL to be acceptable: arousal 0.82, stress 0.80. Cox and Mackay (1985) point out that inability to report feelings may be characteristic of a "disordered psychophysiological state" and lead to a problem of uncertainty concerning mood (see previous section). As a result they scored the frequency of the "?" responses and reported the split-half reliability coefficient for such a "?" scale as 0.89.

Although not used previously in the sports context, the validity of the SACL has been confirmed in a number of clinical and occupational studies (e.g. Burrows, Cox & Simpson, 1977; Cox, Thirlaway & Cox, 1982; Graveling, Simpson, Mabey, Flux, Hodge & Leamon, 1980; Ray & Fitzgibbon, 1981). In these studies, the SACL has proved particularly useful for the measurement of mood in ongoing situations. Several different paradigms have been used (e.g. Watts, Cox & Robson, 1983), and these studies incorporated the repeated administration of checklists to map changes over time, or before and after a specific task (Cox, Mackay & Page, 1982). To minimise practice effects in

studies such as these, the checklist adjectives are presented in different order on colour-coded sheets.

Recent studies have underlined the scale's versatility in a number of vastly different situations, including life on Antarctica (McCormick, Taylor, Rivillies & Cazes, 1985), arousal determinants of smoking (Surawy, Stepney & Cox, 1985), and the measurement of stress and arousal during childbirth (Wilson-Evered & Stanley, 1986).

PHYSIOLOGICAL "MEASURES" OF AROUSAL

A number of putative physiological measures of arousal (and stress) have been developed. These include electroencephalographic (EEG) measurement, along with other autonomic indicants of arousal level such as skin conductance, palmar sweating, changes in heart rate or blood pressure, changes in respiration and changes in muscle tension. In addition, the catecholamines, adrenaline and noradrenaline (epinephrine and norepinephrine), chemicals released by the autonomic nervous system, have been used to monitor arousal levels.

Cox (1985) has criticised the use of supposed physiological measures in the context of stress research, arguing that there cannot be direct physiological measures of stress, but rather physiological correlates of stress. His arguments are based on contemporary stress theory. Beginning with the notion (Lazarus, 1966) that stress, a complex psychological state, can be attributed to the individual's cognitive appraisal and exists as a result of the individual's recognition of his inability to cope with a particular situation, Cox (1985) goes on to argue that this in turn is likely to result in negative feelings of discomfort or unpleasantness (Kagan, 1975). Indeed there are thought to be four factors (Cox & Mackay, 1981; Cox, 1984) involved in this process of appraisal. These include: the demands placed on an individual; the personal resources (characteristics, skills and ability) with which the individual can meet those demands; the constraints that the individual must operate under when attempting

to cope and the support received from others during the coping process. Important here is the perception of the individual as to whether a discrepancy exists between the levels of demand and his or her ability to cope, and stress may only exist if the individual perceives the discrepancy as significant (Sells, 1970).

As Cox (1985) points out, "the classic stressful situation is one in which the person's resources are not well matched to the level of demand and where there are constraints on coping and little social support. Stress, itself, is an individual psychological state. It is to do with the person's perception of the (work) environment and the (emotional) experience of it". The whole point of Cox's (1985) argument hinges around the concept of stress, described above, as concerned with individual perception and experience and being essentially psychological in nature. Consequently, he feels there can be no direct physiological measures of stress, only physiological correlates of stress.

An attempt was made in the second study (see Chapter 4) to incorporate a physiological indicant of arousal (heart rate) into the research design. The electrocardiogram (ECG) is commonly used to monitor heart rate. A more recent and more versatile development with respect to measuring heart rate during movement has been the manufacture of the "Medilog recorder". The recorder is capable of recording on magnetic audio tape for up to 24 hours. The manufacturers claim that the size of the recorder and its light weight (400 gs) means that it can be carried by the subject without restricting movement.

Although there had been no reports of its use for the measurement of heart rate during squash play or even racquet sport-type tasks, it had been planned to use the device as a means of measuring changes in heart rate in part of this research. After an unsuccessful "dry run" during a pilot study (see Appendix A), this proved impossible and unfortunately its use in the main study had to be abandoned. However, for completeness, a short review of research on sports populations

which attempted to measure physiological correlates of arousal is presented below.

Ryan (1962) used a balance stabilometer and galvanic skin response (GSR) measurements on two groups of 20 subjects divided on the basis of high and low responses to skin conductance measurements. In all, five different skin conductance measurements were taken and in every case, apart from initial conductance, performance was significantly better for the group with higher conductance. Lakie (1967) investigated the relationship between GSR, task difficulty and feeling, emotion and motivation. The results, after testing 39 subjects, indicated larger GSR readings for tasks anticipated by the subjects as more difficult. Also, a higher mean GSR score was recorded for the "success-motivated group" on the more difficult tasks.

Harmon and Johnson (1952) carried out a research study on the emotional aspects of athletic sports contests. The subjects of the study were the Boston University American football team, with testing taking place just prior to each game during the 1949 season. Measurements included galvanic skin response, pulse rate and systolic and diastolic blood pressure. Using these physiological indicators of changes in arousal, the authors were able to show that the best game of the season was played when the team was most highly aroused and that the team played extremely poorly when the team registered low arousal levels.

Burwitz, Jakeman and Smith (1982) underlined the work of Elmadjian (1957) who examined adrenaline release during competition using tennis, basketball and professional hockey players along with amateur boxers as subjects. The results indicated that adrenaline was released both prior to and during competition. Daniels and Chosy (1972) incorporated 13 middle-distance runners who took part in the 1968 U.S. trials as subjects, for whom epinephrine release was compared on race and training days. The findings indicated that the amount of epinephrine released was always greater on race days. The distinction between epinephrine and norepinephrine in terms of function was also apparent.

Norepinephrine was found to be concerned with the cardiovascular demands of running, whilst the release of epinephrine seemed connected to the mental demands of the activity.

ANALYSIS OF DATA

The majority of data was collected using an ANOVA design or paradigm and was subject to statistical analysis using that technique. This statistical procedure was warranted because in most cases there was random allocation of subjects to conditions. The only exception was where subjects were categorised according to skill level. Generally, the data from different groups were compared for homogeneity of variance using within groups ANOVA designs. Where this requirement was obviously not satisfied, data were suitably transformed. The first study was based on a correlational design and was therefore an exception to this overall strategy.

SUMMARY

The discussion in this chapter has been concerned with the methods used to gather information about what were considered the more important psychological ingredients of squash play. Of special concern were those factors which might cause performance to be enhanced or hindered. Consequently, a research strategy was adopted which examined pre-competition psychological preparation and on-going psychological strategies during play. In addition, the research strategy had to allow players' reactions to the performance of squash tasks and to competitive play to be measured. Measurement was concerned with the effect of arousal on performance and, in particular, the individual's experience of that arousal in relation to hedonic tone. Other personality and attentional assessments, along with the comparison of players at different ability levels, were incorporated. In the next three chapters, comprehensive reports of each of the individual studies have been presented.

CHAPTER 3

STUDY 1: PSYCHOLOGICAL PREPARATION FOR COMPETITIVE SQUASH

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CHAPTER 3**STUDY 1: PSYCHOLOGICAL PREPARATION FOR COMPETITIVE SQUASH**

INTRODUCTION

Increasing attention is being paid in the sports psychology literature to psychological preparation prior to and during sports performance (e.g. Unestahl, 1982). Cratty and Davis (1984) stated that:

"The mental lives of athletes differ from the usual types of mental activity reported by the non-athlete in several ways. For the most part, the tensions inherent in sport prompt them to spend an inordinate amount of time engaged in thought about their source of achievement. These thoughts literally 'take over' their conscious life, especially during the days of important or intense competitions." (p. 327).

A major debate surrounds the nature of mental preparation. It focusses on whether preparation should have an arousal-increasing ("psyching-up") or an arousal-decreasing (relaxation) effect.

Proponents of the first approach tend to base their views on early versions of drive theory, which considers that performance is directly facilitated by increases in arousal or drive. Research work by Harmon and Johnson (1952) and, more recently, by Fiorini (1978) and Barry (1979), with elite athletes, has produced results which support this approach. Rushall (1979) was in no doubt when he stated clearly that "the more aroused is the elite athlete, the better will be the performance. This to the writer's satisfaction is a fact." (p. 56).

Proponents of the second approach base their views on optimal arousal theory, which considers the relationship between arousal and performance to be represented by an inverted-U curve (e.g. Hebb, 1955;

Fiske & Maddi, 1961; and, in relation to sport, Martens, 1974; Landers, 1978). To a large extent, this latter approach has dominated and, in an effort to maximise performance without exceeding the point of optimal arousal, research work has concentrated on providing athletes with a means of controlling and reducing their arousal levels: meditation (e.g. Layman, 1978), progressive relaxation (e.g. Nideffer & Deckner, 1970), biofeedback (e.g. Bird, 1980) and hypnosis (e.g. Johnson, 1961). The implication is that sports performers tend to be over-aroused or too anxious immediately prior to competitive events and that they should employ techniques to reduce this state. Casual observation suggests that this is not the universal condition, and is an oversimplification of what happens in practice.

Important differences may exist between elite or highly skilled athletes and beginners or less-trained athletes in relation to preparation effects (see for example, Clark, 1960; Decaria, 1977). Clark (1960) studied three groups of subjects, categorised according to previous experience, to determine whether mental practice, when substituted for physical practice in the development of a basketball shooting skill, resulted in an improvement of that skill. The findings indicated that a certain level of motor experience was necessary before the effects of mental practice were maximised. Decaria (1977), using novice and intermediate gymnasts as subjects, found that mental rehearsal (a combination of progressive relaxation training and mental practice) modestly enhanced the gymnastic performance of the intermediate, but not the novice subjects. In addition, results from both groups showed cumulative, but not immediate, decreases in self-reported performance anxiety. However, the number of subjects used by Decaria (1977) was small (n=10).

According to Rushall (1979), it is important that skills are conceptually well-established and practised. He concluded that:

"It is most likely that athletes who train and consistently perform mental rehearsal of the many activities associated

with their sport will achieve higher levels of performance than athletes who only train." (p. 104).

He suggested that imaging prepares the body and mind for activity and serves as the main mechanism for maintaining attentional control on task-relevant factors. Mental rehearsal is considered beneficial, not only with short duration physical skills (e.g. "shooting a basket"; Clark, 1960), but also when used prior to and during complex and extended duration events (e.g. a swimming race; Rushall, 1970). For instance, Rushall (1979), using squash as an example, suggested that in spite of the progressive changes which take place whilst a game like squash is in progress, it is still possible to incorporate mental rehearsal techniques. Rushall emphasised six points about mental rehearsal, first identified by Baroga (1973) in his study of weight lifters. Four of these are directly relevant to the present study:

- "(1) Mediocre athletes concentrate on factors other than performance factors.
- (2) Elite athletes mentally rehearse the exact skill in a successful manner.
- (3) The imagery of elite athletes has exact motor patterns which are of similar form and temporal relationship to the skill.
- (4) The rehearsal time is constant and longer for elite athlete whereas, it is shorter and more varied for mediocre athletes."

In view of Rushall's suggestion that the use of mental rehearsal techniques is possible in squash, but given the lack of scientific data with regard to psychological preparation for this game, it seemed wise to begin the present project by exploring pre-match psychological states and the preparation strategies used by squash players at different levels of playing ability.

METHOD

Design and analysis

This study was based on a correlational design, with some opportunity to compare different groups of subjects on the basis of nationality and skill level. Some data were continuous, some were categorical and others were derived from free report. Generally speaking, one way analyses of variance carried out using SPSS (Morrison, 1982) were used to examine effects of group membership on the continuous variables, while cross-tabulation procedures (Chi square) were used for analysis of the categorical variables. Subjects' comments and opinions were appraised separately and used as supplementary information to support, or otherwise, the statistical findings.

Subjects

Canadian (n=35) and British (n=29) male squash players volunteered to be subjects in this study. Their mean age was 25.3 (SD=5.7) years. The subjects were chosen at random from members of a British university and a private Canadian squash club, of roughly equal standing in their respective sports communities. Two experienced squash coaches, with personal knowledge of the respective players, assisted in subdividing the subjects into groups of similar playing ability. These groups were labelled "novice" (n=23), "average" (n=22) and "skilled" (n=19). The members of the skilled and average groups played competitive squash on a regular basis, at different levels, in their respective area leagues. The novice group, although reasonably competent, were by comparison of a substantially lower skill level. Subjects who had previously agreed to take part in the study were approached at their sporting venue after playing and asked to complete the squash questionnaire.

Measures

The squash questionnaire (see Appendix B.1 and Chapter 2) was used in this study to provide biographical information about the squash players in the sample and details of their psychological state and psychological preparation prior to and during competitive play.

RESULTS AND COMMENTARY

There were no detectable differences between the responses of British and Canadian players, and thus the data from these groups was collapsed.

(1) Subject characteristics

There were no significant differences in the ages of subjects across ability groups ($F_{2,61}=1.24$, $p=ns$), however the age range for the novice group was not as large as for the other two groups. Predictably, the skilled and average groups had been playing for a significantly longer time than the novice groups ($F_{2,61}=4.91$, $p<0.01$) (see Table 5).

TABLE 5. Showing the age and time playing squash for the three ability groups.

GROUP	N	AGE (YEARS)			TIME PLAYING SQUASH (YEARS)		
		MEAN	SD	RANGE	MEAN	SD	RANGE
Skilled	19	26.7	6.3	25	7.1	4.5	16
Average	22	26.3	6.0	23	6.2	4.9	16
Novice	23	24.2	4.5	13	3.3	2.6	9
ANOVA		$F_{2,61}=1.24$, $p=ns$ (1)			$F_{2,61}=4.91$, $p<0.01$		

(1) ns = not significant

The data on frequency of play were collapsed across "response categories" so that subjects playing less and more than twice a week could be compared. It was obvious that, while the average group was split equally across categories, most of the skilled group played more and the majority of the novice group played less than twice per week (Chi square=7.79, df=2, p<0.05) (see Table 6).

TABLE 6. Showing the frequency of play and self-assessment of playing ability for the three ability groups.

GROUP	N	FREQUENCY OF PLAY		SELF-ASSESSMENT RATING	
		<2 PER WEEK	>2 PER WEEK	AGREEMENT WITH COACHES' RATING	
				YES	NO
Skilled	19	7	12	34	7
Average	22	11	11	Skilled/ Average	
Novice	23	18	5	Novice	7 16
CHI SQUARE(+)		7.79, df=2, p<0.05		15.43, df=1, p<0.0001	

(+) Based on raw frequencies

The self-assessment data from the skilled and average groups were also collapsed and, along with data from the novice group, were compared with the coaches' assessment of their playing ability. Although in general the subjects' self-assessment of their own ability for the skilled and average groups corresponded to the coaches' rating, the novice group's did not. A large proportion of the novice group overestimated their ability and considered themselves "average". Differences between groups were significant (Chi square=15.43, df=1, p<0.0001) (see Table 6).

(2) Level of anxiety and use of mental preparation prior to play

All groups reported only mild symptoms of anxiety (as frequently reported by other authors in the literature) prior to competition. The majority reported 0-3 symptoms out of a maximum possible score of 9, with no significant differences apparent between the mean scores for the different groups ($F_{2,55}=0.007$, $p=ns$). Considering the frequency of report, broken down by group, and by low (0-1) and moderate (2-5) level of symptoms, also revealed no significant differences (Chi square=5.39, $df=10$ $p=ns$) (see Table 7).

A much higher proportion of the players stated that they prepared mentally prior to playing within the "skilled" category than within the "average" or "novice" groups. This difference was significant (Chi square=7.51, $df=2$, $p<0.05$). Those subjects who did not prepare mentally indicated that they did not consider it necessary (see Table 7).

TABLE 7. Showing the incidence of pre-game anxiety symptoms and the use of mental preparation for the three ability groups.

GROUP	N	PRE-GAME ANXIETY SYMPTOMS (possible max score=9)		MENTAL PREPARATION	
		0-1	2-5	USED	NOT USED
Skilled	19	7	12	15	4
Average	22	8	14	8	14
Novice	23	8	13	13	10
CHI SQUARE		5.39, $df=10$, $p=ns$		7.51, $df=2$, $p<0.05$	

(3) The nature of psychological preparation

These data related to those players who reported using some form of psychological preparation before play. Some 83% of these players believed that such preparation had a beneficial effect on performance. The different strategies described by the players were listed, discussed and grouped on the basis of similarity by a panel of sports psychologists and squash coaches. This exercise was conducted "blind"; the participants did not know the respondents' answers to any other question. Four groupings were produced, two related to arousal modulation and two to the more cognitive and strategic aspects of play: (1) calming (relaxing, calming down etc.); (2) arousing (psyching up, increasing aggression, getting worked up, etc.); (3) focussing (concentrating, keeping one's mind on the game, increasing attention etc.); (4) planning (thinking the game through, planning strategies or tactics, rehearsing moves) (see Table 8). The distribution of responses by skill level is shown in Table 9.

TABLE 8. Psychological strategies used by players in pre-game preparation

TYPE	STRATEGY	N (36)	%
Arousal Modulation	Calming	5	14
	Arousing	10	28
Cognitive Strategies	Focussing	9	25
	Planning	12	33

There was some similarity in the distribution of responses across categories between the skilled and average groups, and these differ somewhat from the novice group. As shown in Table 9, this difference is most obvious with respect to the "arousing" strategy. The frequencies

with which these two groups reported using arousing or non-arousing strategies were compared (Chi square=3.42, df=1, $p<0.06$). Some examples of the comments on "arousing" made by the novice players serve to illustrate their attitude: "I psych my confidence up and try to maintain a determination to win"; "I sometimes try a hate the opponent attitude"; "Sometimes I think of really having to win, must win". The nature and frequency of these comments contrasted with those recorded for "calming". There were no such comments provided by the novice players, and only a modest number by the skilled and average groups. The relatively small number of players who reported using calming (14% of all subjects of skilled or average ability) is consistent with the low levels of anxiety reported earlier.

Despite this apparent difference by skill level in the actual use of arousal modulation strategies, there was no overall difference in the frequencies with which the two groups used arousal modulation compared to cognitive strategies (Chi square=0.17, df=1, $p=ns$).

TABLE 9. Showing collapsed raw scores, skilled/average and novice groups on "arousing" and other preparation strategies.

GROUP	AROUSING	OTHER	AROUSAL MODULATION	COGNITIVE STRATEGIES
Skilled + Average	4	19	9	14
Novice	6	7	6	7
CHI SQUARE	3.42, df=1, $p<0.06$		0.17, df=1 $p=ns$	

The most obvious difference between skill levels in the reported use of these cognitive strategies appeared with respect to "planning": relatively more skilled and average players used planning elements in their preparation than did novice players (39 to 23%). Planning aspects

of preparation appeared to be the most important for the skilled players (40% reported using this form of preparation), as illustrated by the following comments: "I concentrate on my own game. I also think of my opponent and think of which way I will play him"; "Think through my opponent's strengths and weaknesses. Think of the strategy to be used".

The majority of players from all three groups who used psychological preparation as part of their pre-game strategy stated that the nature of the preparation varied with the importance of the game and the level of ability of the opponent. Generally, psychological preparation was most intense prior to league or cup games, and against players perceived as superior. Most players also reported continuing to "think things through" during play (75%), however, relatively more skilled and average players (91%) reported doing so than did novice players (46%). It is interesting to note from the examples of comments, made to themselves during games, that the novices concentrated on "arousing". A few of the comments of the skilled group also fell into this category, but a greater number fell into the planning category. The replies to the question "Have you experienced a situation where you were psyched up too much or too little" produced almost equal percentages in all three ability groups, indicating that they had all, with little exception, failed on occasions to prepare appropriately.

DISCUSSION

The results of this survey-based research indicated that about half the players questioned reported using some form of psychological preparation before games and believed it beneficial to their performance. Differences existed in that preparation, which appeared to be related to the skill or ability level of the players. A higher percentage of skilled players utilised psychological preparation than

did average or novice players, and there were significant differences in the length of time and frequency of playing squash which might have influenced the development of those strategies.

The pre-game data suggested that players were often not satisfied with their pre-competition state. However, the low level of anxiety identified by self-report of pre-game symptoms suggested that arousal-inducing rather than arousal-reducing procedures would be more appropriate if arousal modulation was a part of psychological preparation. The symptoms listed in this question have been frequently cited in the literature and used elsewhere as indicants of anxiety. Bearing in mind theoretical issues raised in Chapter 1, it should be possible for players to be highly aroused without being anxious. As pointed out in Chapter 2, this question is clearly dealing with physiological indicants of high levels of arousal, some of which may be evoked in exciting as well as in anxiety-provoking situations. To this extent, the results do not necessarily mean that those players not reporting symptoms of high arousal are not highly aroused, but rather that this level of arousal is not disruptive. Logically, this does not preclude them from feeling alert and highly aroused. There is no evidence that they have progressed over the top of the inverted-U curve, past the "optimal point", and therefore arousal reducing techniques cannot be recommended.

As would be expected from the previous finding, the majority of players who did prepare did not use relaxation or calming strategies (86%). Previous research carried out by Sanderson and Gilchrist (1982) on competitive squash players had found no relationship between pre-match anxiety and performance. Referring back to the section in Chapter 1, where a case was made for relaxation to be recognised as only one of the four possible options for affecting arousal, these findings to some extent provide support for such a view.

Many of the novice players who attempted to prepare concentrated on arousing strategies and, even when this was unsuccessful, continued with them. In contrast to the skilled and average groups, relatively

fewer novice players seemed concerned about concentration and attention in planning aspects of play. The most important aspect of preparation for the skilled and average groups was the planning (cognitive) dimension. The results obtained with the novice group go some way to reinforce the points made by Baroga (1973) for weight lifters. Specifically, he described mediocre athletes as "concentrating on factors other than performance factors", which is in agreement with the novice group's lack of concern for factors other than the arousing dimension. Also, work undertaken by Hughes (1986), reported earlier, had shown that recreational players were not accurate enough in their shots to sustain tactical plans, thus suggesting, perhaps, that before inexperienced players can think about tactical and strategical elements of performance a degree of technical expertise must be acquired. Unlike the novices, where arousal seemed to be uncontrolled and undirected, the skilled and average players were also concerned with other performance factors. Although the squash players who comprised the skilled group could not be considered as entirely compatible with the elite athletes in Baroga's study, there was evidence to suggest that, like them, the skilled and average squash players were very conscious of planning considerations. A model showing the elements of psychological preparation for competitive squash identified in this study is offered in Fig. 7.

In retrospect, it would have been advantageous to have examined the personality characteristics of the different groups of subjects in this study. This might have identified differences between ability groups with respect to, for example, skilled players' orientation to planning, either in the general sense or in specific situations concerned with competitive play in squash. The different cognitive strategies used by the players at different levels of ability in their pre-game psychological preparation warrant further investigation. For instance, a large proportion of the novice players in this study failed to change to a different strategy even when a particular strategy proved unsuccessful. By examining the attentional strategies or styles of players of different ability, it may be possible to elicit more specific information about the contribution of cognitive processes to

success in squash. In a more structured way, measures of personality and attentional style were included in Study 2, with the aim of adding to the understanding of the psychological processes involved in competitive play.

SUMMARY

A degree of support for Rushall's view expressed earlier was provided by the findings from this study. Whilst not necessarily the correct approach for every player, for many of these players, high levels of arousal are an implicit and important element in both psychological preparation and subsequent performance. The data on pre-game anxiety and arousal suggest that the use of arousal reducing techniques in pre-competition preparation, whilst possibly appropriate elsewhere, with other sports, is not appropriate with squash players. On the other hand, only a relatively small proportion (20%) of skilled players in this study attempted to increase their levels of arousal. It is therefore concluded that deliberate arousal modulation is not a necessary part of the psychological preparation for squash, although some players do attempt it. It might be that arousal increases during games as a natural consequence of play. The next study set out to obtain a clearer picture of arousal effects by studying individuals performing squash tasks under game-like conditions.

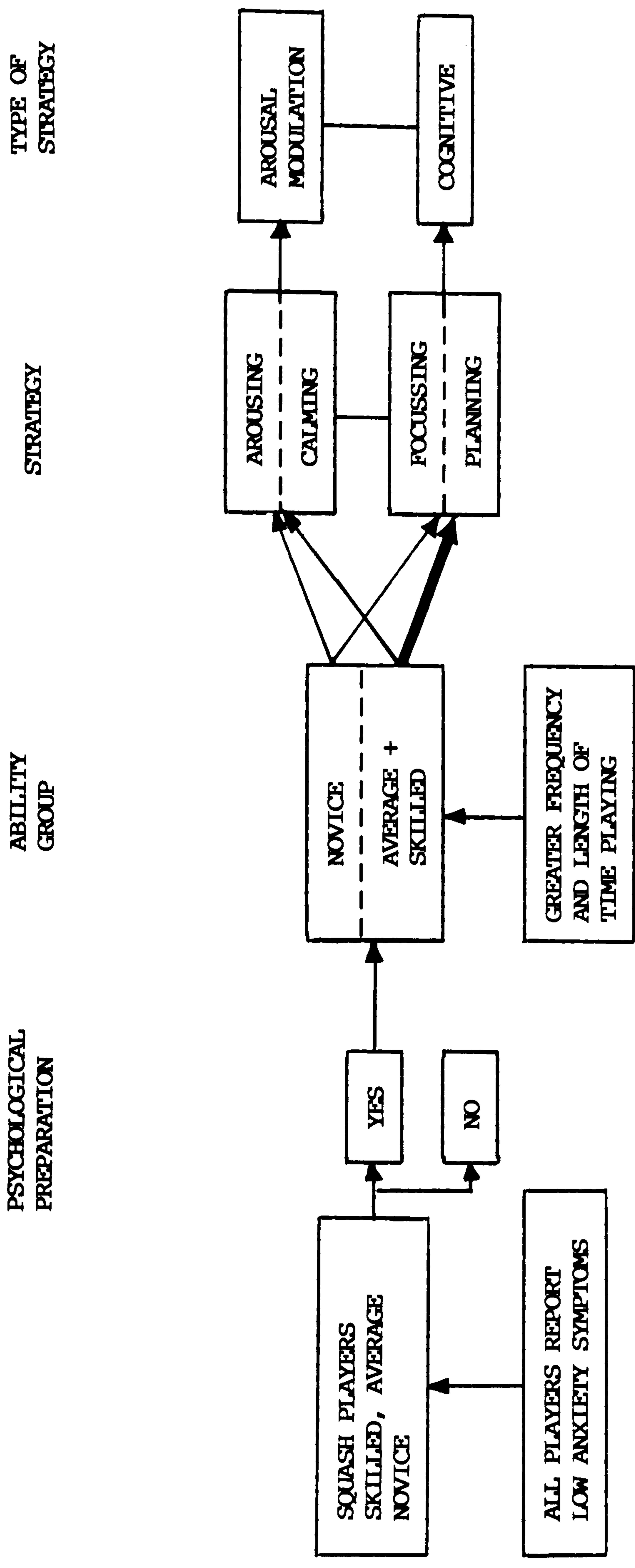


FIG. 7. MODEL OF ELEMENTS OF PSYCHOLOGICAL PREPARATION FOR SQUASH.

CHAPTER 4

STUDY 2: COGNITION AND MOOD IN RELATION TO THE PERFORMANCE OF A SQUASH TASK

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CHAPTER 4**STUDY 2: COGNITION AND MOOD IN RELATION TO THE PERFORMANCE OF SQUASH TASKS**

INTRODUCTION

In the light of arguments about the "ecological" validity of experimental techniques in sports psychology research (Whiting, 1972; Glencross, 1978; Martens, 1979), it was decided that the experimental analysis of squash performance could provide a valid example of applied field research. Squash players could be required to perform skills in familiar, realistic surroundings, but at the same time, because of the enclosed nature of a squash court, the conditions under which they did so could be relatively tightly controlled. This scenario could, for example, provide a context in which task difficulty might be manipulated and its effects studied.

Study 1 examined the psychological preparation strategies of "novice", "average" and "skilled" squash players prior to and during competitive play. The study found that clear differences existed in pre-competitive preparation which were related to the skill level of the players. Such a study posed questions concerning both the reactions of these different groups of players to the actual game, and their performance. In other studies, the "reactions" of players have usually been conceptualised and measured in terms of changes in anxiety (e.g. Klavora, 1978). Although closely related to "arousal", the concept of anxiety is fundamentally different. "Anxiety" refers to behaviour along two dimensions, those of intensity and quality, and suggests some cognitive activity by the individual. The term "anxiety" also has negative connotations. "Arousal", on the other hand, has only intensity. It is not inherently pleasant or unpleasant, but may attract such "hedonistic" overtones, depending on the degree to which the actual level of arousal is appropriate to that required for effective behaviour (Cox, Thirlaway & Cox, 1982).

Due to the complex nature of the interaction between arousal and performance, the chosen methods of measurement should interfere with the performance process as little as possible. In addition, in order to take account of situational factors, arousal levels should be monitored as close in time to the actual performance as possible. In order to fulfil these requirements, self-report measures have been designed which require a reasonably short time for completion, administered pre and post performance. It was thought that this procedure would not affect the responses of players involved in the performance of a squash task.

Task difficulty is known to be an important intervening variable in the complex relationship between arousal and performance. Following the arguments of optimal arousal theory, several authors have suggested that the range of optimal arousal associated with maximum performance decreases with increases in task difficulty (e.g. ^{VERKES AND DODD, 1908} Fiske & Maddi, 1961; Landers, 1978). Martens (1977, p. 125) has proposed that the combination of greater physical energy requirements and increased levels of task difficulty (conditions which exist in many sports) will restrict the range of optimal arousal still further.

Linked in with these arguments is the notion that increases in arousal levels produces attentional narrowing in performance tasks (Easterbrook, 1959). However, other research undertaken by, for example, Broadbent (1971), Naatanen (1973) and Kahneman (1973) has indicated that interactions between arousal and attention are more complicated than Easterbrook's hypothesis suggests. Eysenck (1982, p. 53) points out that Easterbrook's hypothesis conceptualises narrowing of attention under high arousal conditions as a passive and automatic process, and argues that a more accurate view would consider attentional narrowing as a "an active coping response". However, the ideas proposed by Easterbrook have been influential and used as the foundation of several, more recent, theoretical approaches. An example is the work of Nideffer (1976), which is often referred to in sports psychology literature.

It had been hoped to incorporate the use of the Medilog heart rate recorder to provide an additional physiological correlate of arousal in this study. Oxford Medical Systems, the manufacturers of the Medilog 2-24 heart rate recorder, claim that the instrument was designed especially for use with mobile subjects. For this reason it was thought that it would be particularly useful for measuring heart rate with squash players. However, prior to the experimental procedure being finalised, a small scale pilot experiment (see Appendix A) was carried out to pinpoint possible problems in the experimental set-up. Heart rate recordings obtained during the pilot study proved unsuitable for analysis. This was thought to be due to a combination of factors affecting electrode contact, including the vigorous nature of the movements involved and the effect of perspiration after warm-up. Consequently, it was reluctantly decided to abandon attempts to obtain physiological data in this experiment.

It may be worth noting that, whilst disappointing, the fact that the Medilog recorder could not be used resulted in subjects being able to perform the squash tasks in a completely unrestricted manner, and some subjects did report that their movements had been restricted to some degree by the electrode leads. In addition it is likely that, for some subjects, going through the process of having the apparatus attached might have brought about a change in mood state. This in turn might have affected their experience of the situation, thus possibly affecting performance.

The present study concerned possible changes in self-reported mood during the performance of a squash-related practice task by players of varying levels of competence. Task difficulty was investigated as an independent variable, while individual differences beyond playing ability were assessed using the Eysenck EPI (Eysenck, 1964) and the Nideffer TAIS (Nideffer, 1976). It was hypothesised that not only would there be the expected differences in performance, confirming the categorisation of players, but that these would be related to the way in which subjects coped with the squash task (style) and reacted to it

(mood). The obvious prediction was that skilled players would show different attentional style to the other ability groups and react more positively to the situation.

METHOD

Subjects

The participants were informed volunteers from among staff and student squash players at a British university. They were assigned to three groups, labelled "skilled", "average" and "novice", on the basis of playing ability. Playing ability was assessed in conjunction with an experienced squash coach. All the subjects were male (n=40) and ranged in age from 18 to 37 years, with a median of 20.9 years (Mean=22.6, SD=4.4). Although there was no significant difference between groups with respect to age, the age breakdown by group was as shown in Table 10.

TABLE 10. Mean age, range and standard deviations for squash ability groups.

GROUP	N	RANGE	MEAN	SD
Skilled	13	19-37 yrs.	24.2	(5.9)
Average	13	18-30 yrs.	22.6	(2.8)
Novice	14	19-27 yrs.	21.2	(2.7)

Design

A factorial design was employed to investigate the effects of task difficulty on the psychological state of the players. In addition to

level of skill, there were two other factors with repeated measures on the second. The first factor was the difficulty of the task, (easy vs. difficult), and the second factor time of testing on the various measures. Half the subjects in the skilled, average and novice groups completed task 1 (easy), then task 2 (difficult), and the other half completed task 2 (difficult) first and then task 1 (easy). Effects of task difficulty on performance were also examined.

Squash: situation and task

A standard-sized squash court with the regulation markings was used in this experiment. It was modified by the placement of additional markings to highlight target areas. The additional markings, in red marking tape (shown in Figs. 8a and 8b), were placed on both sides of the courts to accommodate right and left handed squash players. Subjects were permitted to use their own squash racquets, but squash balls (yellow dot) were provided.

Following discussions with two experienced squash coaches, a realistic practice task was designed with two levels of difficulty. It was based on a common technique in squash - the forehand shot close to the side wall which lands in the rear corner of the court. (The closer the shot is to the side wall and the rear corner, the more difficulty the opponent has in making a return shot). It is also common practice for squash players during a warm-up to repeatedly hit a number of these forehand shots down the same wall, endeavouring to keep the ball close to the wall and obtain "good length".

(1) Easy Task Condition

The target shown in Fig. 8a was subdivided into three areas, with the highest points score for the area closest to the side wall.

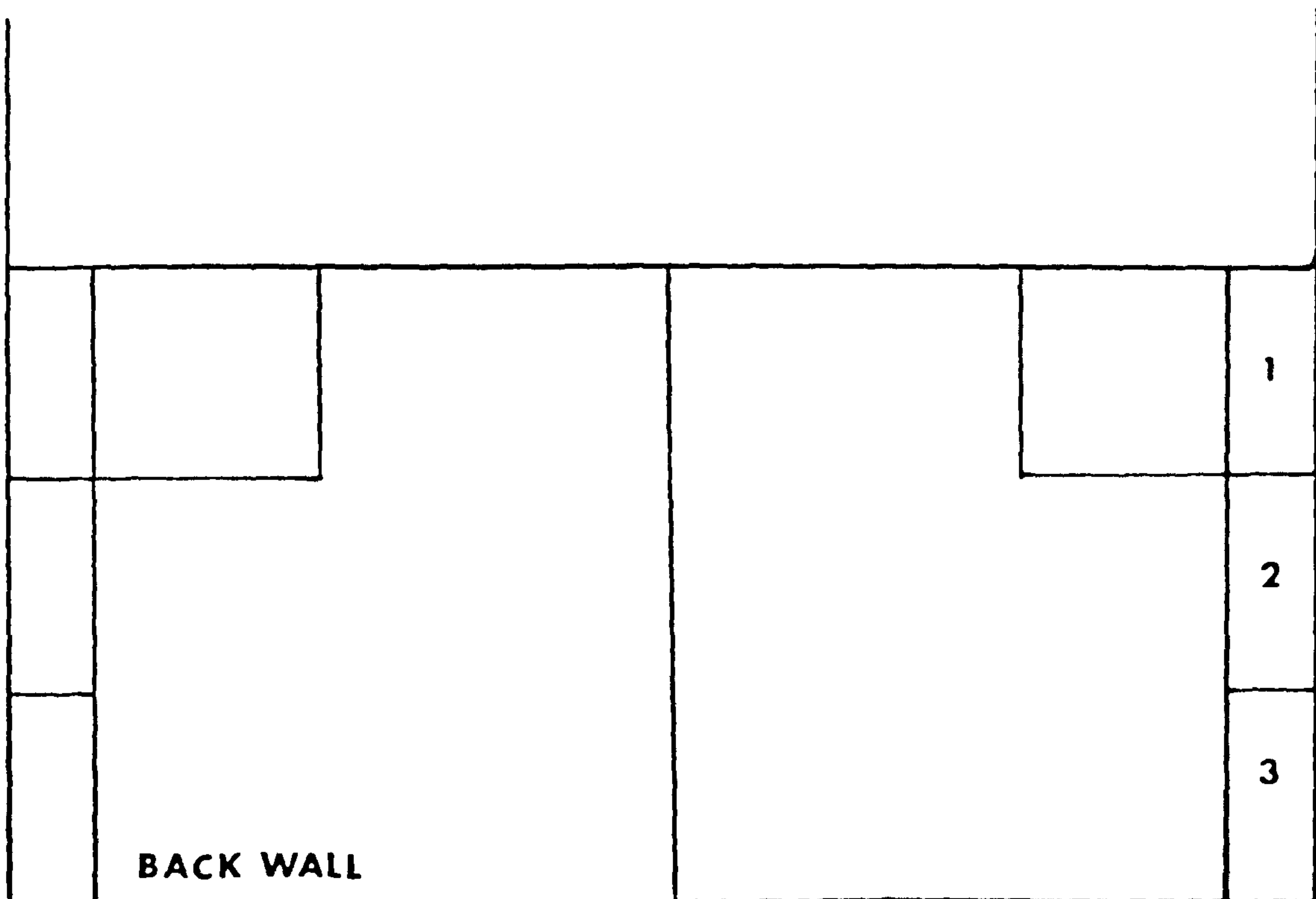
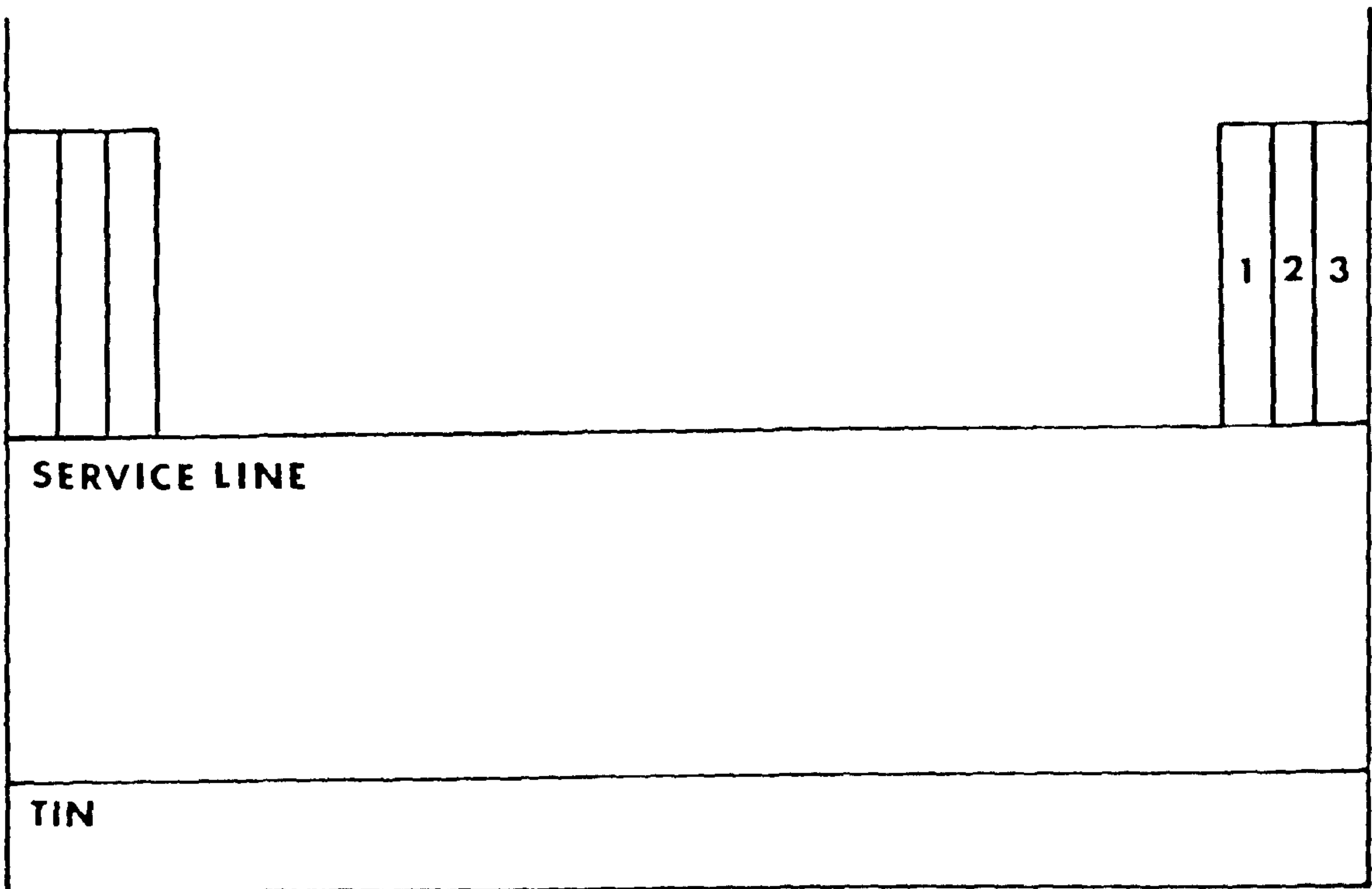
Subjects were required to strike this marked target area on the front wall of the squash court with 30 continuous forehand shots, hit from a position at the rear of the court. There was no time limit. If, for any reason, the ball went astray, subjects were instructed to collect the ball and begin again, adding to the score already attained until 30 good shots were completed. The scores from successful shots were marked by an independent observer.

(2) Difficult Task Condition

Conditions were similar to those for the easy task, with one exception. Subjects were informed that each forehand shot had, preferably, to strike the target on the front wall and then the target in the rear corner of the court (see Fig. 8b) before being struck again. Subjects were told that they scored if their shots hit either or both targets. However, in order to facilitate analysis of the results and comparison between the two tasks only successful scores on the front wall target were used.

Measures

The following measures were used in this study to obtain information about intervening variables: the Eysenck Personality Inventory (EPI; Eysenck, 1964); the Test of Attentional and Interpersonal Style (TAIS; Nideffer, 1976); the Telic Dominance Scale (TDS; Murgatroyd et al., 1978). In addition, the Stress-Arousal Checklist (SACL; Mackay et al., 1978; Cox & Mackay, 1985) and the Telic State Measure (TSM; Svebak & Murgatroyd, 1985) were used to assess individual psychological states or responses before and after performance on the squash tasks.



Figs. 8a & b: Showing front wall and rear court targets used in the squash tasks (easy and difficult).

NOTE: See also Figs. A.1a & b in Appendix A, which show a subject performing the squash task during the pilot study.

Procedure

The study was executed in two stages (see Fig. 9). First, prior to the actual day of performing the squash tasks, the subjects completed the Eysenck Personality Inventory, the Test of Attentional and Interpersonal Style and the Telic Dominance Scale (see Chapter 2) administered on a group basis. Second, on the day of the experiment, wearing suitable squash clothing, subjects arrived at a quiet office near the squash courts where they were asked to complete the Stress-Arousal Checklist and the Telic State Measure, (see Chapter 2). Both measures were demonstrated to subjects, who were then given the opportunity to practice completing them. These data were not analysed. Following this, subjects were escorted to the squash court and informed of what was required in the two squash tasks.

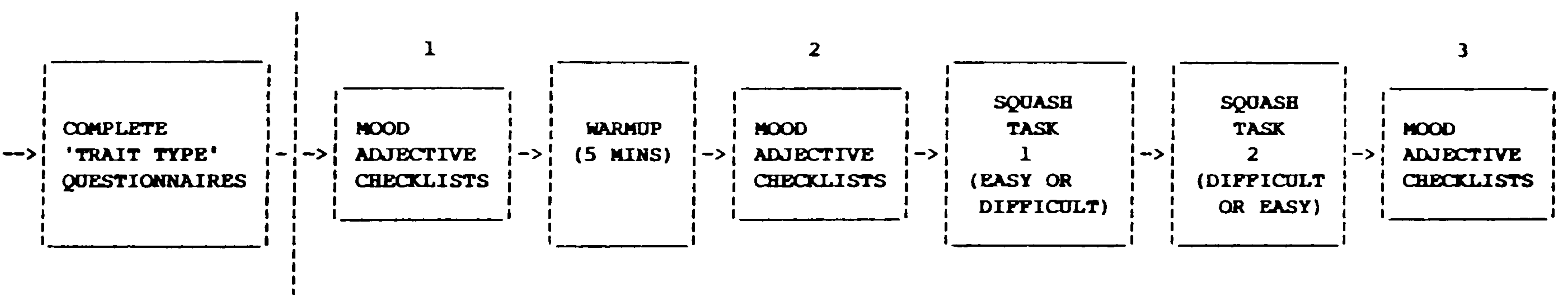


Fig. 9. Diagrammatic representation of the experimental procedure.

Subjects were allowed a five minute warm-up period. In the warm-up, subjects were requested to perform forehand shots to the front wall from a position at the centre-rear of the court, gradually moving closer to the side wall. After five minutes, subjects again completed the state measures and then engaged in the first squash task. Following this, subjects were requested to begin the second squash task, after which they again answered the state measures.

RESULTS AND COMMENTARY

(1) Attentional style

In order to provide some structure to the information obtained from the subjects performing the squash tasks, an initial examination of the attentional subscales from the Nideffer (1976) test was undertaken. Profiles were constructed of the subjects comprising each of the skilled, average and novice groups.

Differences between the three groups were tested using one-way ANOVA; where necessary, scores were transformed ($x=\sqrt{x}$) before analysis. Using the raw data (see Table 11), significant differences between groups were identified on only one subscale, "information processing" (INFP), which measures the individual's ability to process stimulus information ($F_{2,37}=3.22$, $p=0.05$). Skilled and novice players' mean scores on this subscale were lower than the mean score of the average players.

Following a square root transformation of data to reduce heterogeneity of variance, two other subscales, "reduced attentional focus" (RED) ($F_{2,37}=2.99$, $p=0.06$), and "broad internal attentional focus" (BIT) ($F_{2,37}=4.65$, $p=0.016$), were shown to demonstrate significant or near significant differences between groups. The first of these subscales measures the tendency of individuals to make errors because they narrow their attention too much, and the second the ability to integrate ideas and information from several different sources effectively. The mean scores of the skilled and novice subjects were lower on the broad internal attentional focus subscale, but higher on the reduced attentional focus subscale, than the mean scores for average subjects.

TABLE 11. Showing a summary of subject's scores on the attentional styles subscales from Nideffer's (1976) Test of Attentional and Interpersonal Style (TAIS).

NIDEFFER ATTENTIONAL SCALES	SIGNIFICANCE	EFFECTS
BROAD EXTERNAL ATTENTIONAL FOCUS (BET)	ns	
OVERLOADED BY EXTERNAL STIMULI (OET)	ns	
BROAD INTERNAL ATTENTIONAL FOCUS (BIT)	* $F_{2,37}=4.65$ $p=0.016$	SKILLED & NOVICE SCORES SIMILAR & LOWER THAN AVERAGE GROUP
OVERLOADED BY INTERNAL STIMULI (OIT)	ns	
NARROW ATTENTIONAL FOCUS (NAR)	ns	
REDUCED ATTENTIONAL FOCUS (RED)	* $F_{2,37}=2.99$ $p=0.06$	SKILLED & NOVICE SCORES SIMILAR & HIGHER THAN AVERAGE GROUP
INFORMATION PROCESSING (INFP)	$F_{2,37}=3.22$ $p=0.05$	SKILLED & NOVICE SCORES SIMILAR AND LOWER THAN AVERAGE GROUP

* DATA TRANSFORMED
ns = NON-SIGNIFICANT

(2) Personality factors

Skilled players exhibited higher levels of "self-esteem" (SES, Nideffer), "extraversion" (Eysenck) and "physical orientation" (P/O, Nideffer), and lower levels of "introversion" (INT, Nideffer),

"neuroticism" (Eysenck), "obsession" (OBS, Nideffer) and "depression" (DEP, Nideffer), and showed greater tendency to express their feelings to others (PAE, Nideffer). A summary of the mean scores for the skilled and novice groups on these subscales is shown in Table 12. This table is reproduced in Appendix C (Table C.4.1) with data from three other non-sports samples taken from Nideffer (1977).

TABLE 12. Mean personality subscale scores and standard deviations for the skilled and novice groups.

PERSONALITY SUBSCALES	SKILLED	NOVICE
NIDEFFER SELF ESTEEM (SES)	23.1 (SD=7.1)	19.9 (SD=4.8)
EYSENCK EXTRAVERSION ++	17.1 (SD=4.0)	14.6 (SD=2.9)
NIDEFFER EXTROVERSION (EXT)	31.9 (SD=5.8)	28.4 (SD=5.1)
NIDEFFER PHYSICAL ORIENTATION (P/O)	21.0 (SD=3.9)	18.0 (SD=3.5)
NIDEFFER POSITIVE AFFECT EXPRESSION (PAE) *	24.3 (SD=3.4)	19.4 (SD=2.7)
NIDEFFER INTROVERSION (INT)	16.5 (SD=3.3)	18.4 (SD=3.7)
EYSENCK NEUROTICISM *	4.8 (SD=2.4)	8.4 (SD=3.8)
NIDEFFER OBSESSIVE (OBS)	14.5 (SD=4.2)	15.7 (SD=3.8)
NIDEFFER DEPRESSION * (DEP) +++	4.5 (SD=1.7)	6.7 (SD=3.8)
NIDEFFER NEGATIVE AFFECT EXPRESSION (NAE)	12.9 (SD=3.8)	12.9 (SD=3.3)

* SIGNIFICANT DIFFERENCES BETWEEN GROUPS ($p < 0.05$)

++ DIFFERENCES BETWEEN GROUPS APPROACHING SIGNIFICANCE ($p = 0.06$)

+++ NOTE: The Nideffer depression subscale is not included in the list of 17 subscales as it forms part of the computation of the self esteem (SES) score.

No significant differences were found between skilled, average, and novice players on total telic dominance scores or any of the subscale scores (see Appendix C, Table C.4.2). Planning orientation ($F_{2,34}=0.47$, $p=ns$), seriousmindedness ($F_{2,34}=2.08$, $p=ns$), arousal avoidance ($F_{2,34}=0.24$, $p=ns$), total telic dominance ($F_{2,34}=0.43$, $p=ns$). Total telic dominance scores reflected the individual total scores of players in all three groups, few of which fell at the paratelic end of the telic paratelic dimension.

(3) Performance scores and order effects

As might have been expected, skilled subjects scored higher (Mean=44, SD=8.56) than average subjects (Mean=33, SD=7.85) who scored higher than novice subjects (Mean=28, SD=9.12).

An interesting finding from the squash task performance scores was that subjects completing the tasks in the order task 1 (easy) then task 2 (difficult) scored significantly higher on task 2 than subjects completing task 2 before task 1. Scores on the difficult task were better after practice on the easy task. Subjects completing the tasks in reverse order (i.e. task 2 then task 1) showed no differences in scores across tasks. However, this pattern of differences was least obvious for the skilled group (see Tables 13 and 14).

TABLE 13. Showing the relationship between task order and performance.

TASK ORDER	TASK NO.	N	MEAN	SD
TASK 1/TASK 2	T1	22	34.68	(10.45)
TASK 1/TASK 2	T2	22	40.05	(11.09)
TASK 2/TASK 1	T1	18	32.83	(8.22)
TASK 2/TASK 1	T2	18	32.11	(11.49)

A two-way analysis of variance was used to examine the performance scores. As predicted and shown in Table 14, significant differences between groups were obtained.

TABLE 14. Summary of two-way analysis of variance scores showing group differences on performance.

SOURCE	SS	df	MS	F	p
GROUP	3446.21	2,34	1723.10	20.20	0.000
ORDER	473.73	1,34	473.73	5.55	0.020
GROUP X ORDER	315.43	2,34	157.72	1.85	ns
TASK	137.81	1,34	137.81	3.37	ns
GROUP X TASK	70.47	2,34	35.23	0.86	ns
ORDER X TASK	183.34	1,34	183.34	4.48	0.042
GROUP X ORDER X TASK	149.98	2,34	74.99	1.83	ns

(4) Self-reported mood (SACL)

Initial arousal levels, as measured by the SACL, and partly determined by anticipation of what was required in the experiment, were high and were then maintained at those high levels throughout the test period (pre-session: Mean=10.8, SD=1.8; post-session: Mean=10.4, SD=2.0). There were no significant differences between groups, ($F_{2,34}=2.42$, $p=ns$). However, there were significant differences between the three groups in the levels of self-reported stress (see Table 15). There was no significant increase in self-reported stress across the test session for any of the groups, ($F_{2,34}=0.31$, $p=ns$).

TABLE 15. Showing mean SACL stress levels.

GROUP	MEAN	SD
NOVICE	7.46	(3.43)
AVERAGE	6.80	(4.74)
SKILLED	3.65	(3.43)

$F_{2,34}=3.37$ $p<0.05$		

A definite pattern emerges from the mood data. For the average and novice groups, high self-reported stress accompanied high arousal before the test session, and these levels remained constant throughout the experiment. By contrast, for the skilled group, low stress accompanied high levels of arousal, and those levels were also maintained.

(5) Self-reported mood (TSM)

Differences between groups were non-significant on all five items of the TSM, although differences between groups in felt arousal pre-performance approached significance (skilled=novice<average ($F_{2,33}=3.04$, $p=0.06$)). Significant or near-significant increases in the telic direction, pre to post task, were obtained on the planning-spontaneous ($F_{1,33}=11.28$, $p=0.002$) and serious-playful ($F_{1,33}=3.73$, $p=0.06$) items. In addition, significant increases in felt arousal ($F_{1,33}=8.68$, $p=0.006$), pre to post task, were found (see Table 16).

Consideration of the scores on the seriousmindedness item from the TSM (thought, for the telic-paratelic pair, to be the best indicator of operative metamotivational state in any particular situation) indicated that the majority of subjects were in the telic state (see Table 17) pre and post completion of the squash tasks. In addition, a high percentage of subjects, including those in both the telic and paratelic states, recorded that they were experiencing high levels of felt arousal, both just before and just after task performance.

TABLE 16. Showing a summary of pre and post squash task mean scores and standard deviations for the 3 squash ability groups on the 5 items of the Telic State Measure (TSM).

	N	PRE TASK		POST TASK		COMMENT
		MEAN	SD	MEAN	SD	
<u>SERIOUS-PLAYFUL</u>						
SKILLED	13	2.4	(1.12)	2.4	(1.39)	No significant differences between groups in reaction to tasks. Overall an almost-significant reduction in scores (pre->post) with no interaction between these two factors ($F_{1,33}=3.73$, $p=0.06$).
AVERAGE	13	2.7	(1.60)	2.1	(1.55)	
NOVICE	13	2.8	(1.24)	1.9	(0.95)	
<u>PLANNING-SPONTANEOUS</u>						
SKILLED	13	3.4	(1.45)	3.2	(1.46)	No significant differences between groups, no interaction effect. Significant differences pre->post task ($F_{1,33}=11.28$, $p=0.002$). Effect less marked for skilled group.
AVERAGE	13	4.2	(1.52)	3.0	(1.68)	
NOVICE	13	3.4	(1.71)	2.7	(1.49)	
<u>FELT AROUSAL</u>						
SKILLED	13	3.4	(1.26)	3.9	(1.12)	Nearly significant differences between groups pre performance $s < n < av$. ($F_{2,33}=3.04$, $p=0.06$). Increases in felt arousal across tasks significant, ($F_{1,33}=8.68$, $p=0.006$). No interaction effect.
AVERAGE	13	4.4	(0.87)	4.6	(1.12)	
NOVICE	13	3.2	(1.01)	4.5	(1.51)	
<u>PREFERRED AROUSAL</u>						
SKILLED	13	3.5	(1.13)	4.1	(1.12)	No significant differences. Skilled and novice groups scores increase, average group scores decrease pre->post task.
AVERAGE	13	4.6	(1.12)	4.5	(1.13)	
NOVICE	13	3.8	(1.24)	3.9	(1.34)	
<u>D-SCORE DISCREPANCY BETWEEN PREFERRED AND FELT AROUSAL</u>						
SKILLED	13	2.9	(1.34)	1.2	(1.03)	No significant differences between groups. Significant decrease in discrepancy pre->post task, least for skilled group. ($F_{1,33}=64.07$, $p=0.0001$). Significant interaction effect, ($F_{2,36}=4.19$, $p=0.02$).
AVERAGE	13	4.6	(1.73)	0.9	(1.39)	
NOVICE	13	3.8	(1.27)	1.7	(1.16)	

TABLE 17. Showing numbers of subjects pre and post task performance in telic and paratelic states and experiencing high levels of felt arousal.

	N	TELIC	PARATELIC	CHI SQUARE (actual compared to equal distribu- tion of scores)	HIGH AROUSAL
TOTAL PRE TASK	39 (20:19)	31	8	12.42, df=1 p<0.001	25 (63%)

TOTAL POST TASK	39 (20:19)	32	7	14.78, df=1 p<0.001	30 (75%)

The discrepancy score results (preferred arousal minus felt arousal) showed a significant decrease pre and post task ($F_{1,33}=64.07$, $p=0.0001$). This discrepancy was least for the skilled group. In addition, a significant interaction between group on the one hand and pre and post arousal discrepancy was obtained, ($F_{2,36}=4.19$, $p=0.02$).

DISCUSSION

The data from this study extends present knowledge of the psychological aspects of squash performance. It established that skilled players, who performed better than average and novice players in a practice task, also showed a different pattern of mood response to that task. Skilled players showed significantly lower levels of stress than average and novice players over the entire test period (pre and post), but similarly high levels of arousal. Perhaps because of their greater level of skill they experienced the task demands as somewhat more manageable and thus more pleasant (see Cox, 1985).

The differences between the three groups appeared to be invested in more than just the level of skilled performance and to also relate to cognitive skills. Interestingly, the skilled and novice groups

appeared to use similar information processing and attentional strategies, which were different from those of the average group. Skilled and novice players scored lower on "broad internal attentional focus" and higher on "reduced attentional focus". According to Nideffer, this suggests that skilled and novice players generally seem to perceive the environment as less "busy" than average players and, in terms of information processing, these players are more able to concentrate on particular environmental demands, whilst the average players are still preoccupied by the general environment. When required, skilled and novice players may thus be better at narrowing attention and may not be so "wrapped up" in what is happening or about to happen that they become unaware of changing environmental conditions. It seems possible that when skilled and novice players focus down in this way, the skilled players have learned to focus down on the correct features of the playing environment. This would be reflected in their superior performance.

On the basis of this data, it is tentatively suggested that novice players, while sharing the "right" attentional strategies with skilled players, possibly focus on the wrong elements of the game. This contrasts with the average players who do not use the same "right" strategies as the skilled players. It might follow that novice players can develop in two ways: (a) by maintaining the right strategy but now focussing on the right elements of the game; or (b) by changing strategy to that used by average players. In the first case, the novice players would be "in the fast lane" of development into skilled players. Perhaps, as established from the results of the novice and skilled players in Study 1, by concentrating more on elements of preparation prior to playing such as planning, the most important aspect of preparation for the skilled players, this development might be advanced. A further implication might be that average players must be doing something "right", but that there may be a ceiling to their improvement, and few will easily develop into skilled players.

It seems possible that these differences in attentional style may be crucial to being successful in squash and that, even though novice

players have the necessary attentional style to become skilled players, other factors are involved. For instance, Study 1 showed that, generally, skilled players had been playing for a longer period and played more frequently than the average and novice players. However, there may be other psychological factors which could also play an important role. These factors may be characteristic of the general attitudes of the players and may reflect important differences in personality variables. The skilled and novice groups differed in terms of their personality and behavioural style. Examining the personality scores of skilled and novice players, it became clear that they differed in a consistent pattern on a number of subscales across different tests. It is possible that the personality characteristics of the skilled group identified in this study may have had a part to play in the way the experimental task demands were perceived by the skilled players. The skilled players exhibited higher levels of extraversion and self-esteem and were less neurotic, introverted, obsessive, subject to depression and more likely to express their feelings to others. Interestingly, novice players in Study 1 reported using arousing techniques, which included getting worked up and aggressive towards opponents, to a near-significantly greater extent than the skilled players in the same study.

There is, of course, a problem of implying causality with such data: no more than an association between skill level and personality is implied here.

With respect to mood, initial arousal levels in this study (as measured by SACL) were high and remained high throughout the experiment for players in all three ability groups. However, the players' experience of the experimental task demands, reflected in self-reported stress levels, was very different for the skilled group when compared with the novice and average players. For the skilled players, the high levels of arousal experienced prior to and during the task were reported as non-stressful. With respect to felt arousal (as measured by TSM), significant increases, pre to post task, were obtained, but skilled players appeared more successful than the other players at

achieving the preferred level of felt arousal. For the novice and average subjects, a significantly greater discrepancy between actual and preferred levels of felt arousal was identified. In reversal theory terms, this greater discrepancy in arousal levels would be experienced as increasingly stressful, thus providing confirmation of the higher levels of self-reported stress by the novice and average groups on the SACL measure. Skilled subjects, perhaps by virtue of their superior ability or experience, were relatively less affected by, and more successful at minimising, ^{NEGATIVE} emotional responses to task demands. Of importance is their apparent ability to produce the desired arousal level for performance in this context. Consequently, for the skilled players, the completion of the squash performance tasks was likely to have been associated with positive hedonic tone and experienced as pleasant.

This finding is supported to some degree by the low level of pre-game anxiety symptoms reported by skilled players in the previous study, and by the findings of Dowd and Innes (1981), who reported that skillful players scored lower on anxiety than less skillful players. The Telic State Measure also indicated, perhaps not unexpectedly, that although there were no significant differences between ability groups, subjects generally registered scores reflecting higher levels of seriousmindedness and planning orientation after performance on the task. It should be noted here that a large number of telic dominant subjects in the telic state, pre and post task performance, tolerated (usually non-preferred in the telic state) high levels of arousal. However, no particular group pattern emerged. Also, between the first and second completion of the TSM, seven subjects (from different ability groups) underwent reversals, three from the telic to the paratelic state, and four from the paratelic to the telic state (see also Chapter 6).

It is likely that, apart from initial variations in ability, differences of this nature in reported mood would affect performance. As can be seen from the mean performance scores in Tables 13 and 14 there is some evidence supporting this argument. Here the performance

scores of the average and novice groups were relatively close together whilst the scores of the skilled group were, by comparison, rather higher than might be expected if the differences were due solely to ability differences. Fig. 10 provides an overview of the interaction of cognition and mood with squash task performance.

From these data it is not possible to comment on whether these individual differences result from or determine the level of skill and the membership of the various groups.

SUMMARY

This study was an attempt to follow the suggestions of Whiting (1972), Glencross (1978) and Martens (1979) and set up applied field research by importing experimental techniques into situations which have "ecological" validity. Differences in pre-game psychological preparation related to the skill level of players were identified in Study 1. It seemed essential to extend these self-reported findings in a relatively controlled experimental environment which would allow the reactions of players to their performance of squash skills to be measured under game-like conditions. It became apparent, from the findings of this study, that how the player interprets a particular situation and how that experience is perceived by the player in relative feelings of pleasantness or unpleasantness is an important element in performance. However, in spite of the success of this study, an even better understanding might be obtained by monitoring players' psychological reactions during actual competitive play. Consequently, a central feature of the third study involved studying players' reactions under competitive tournament conditions.

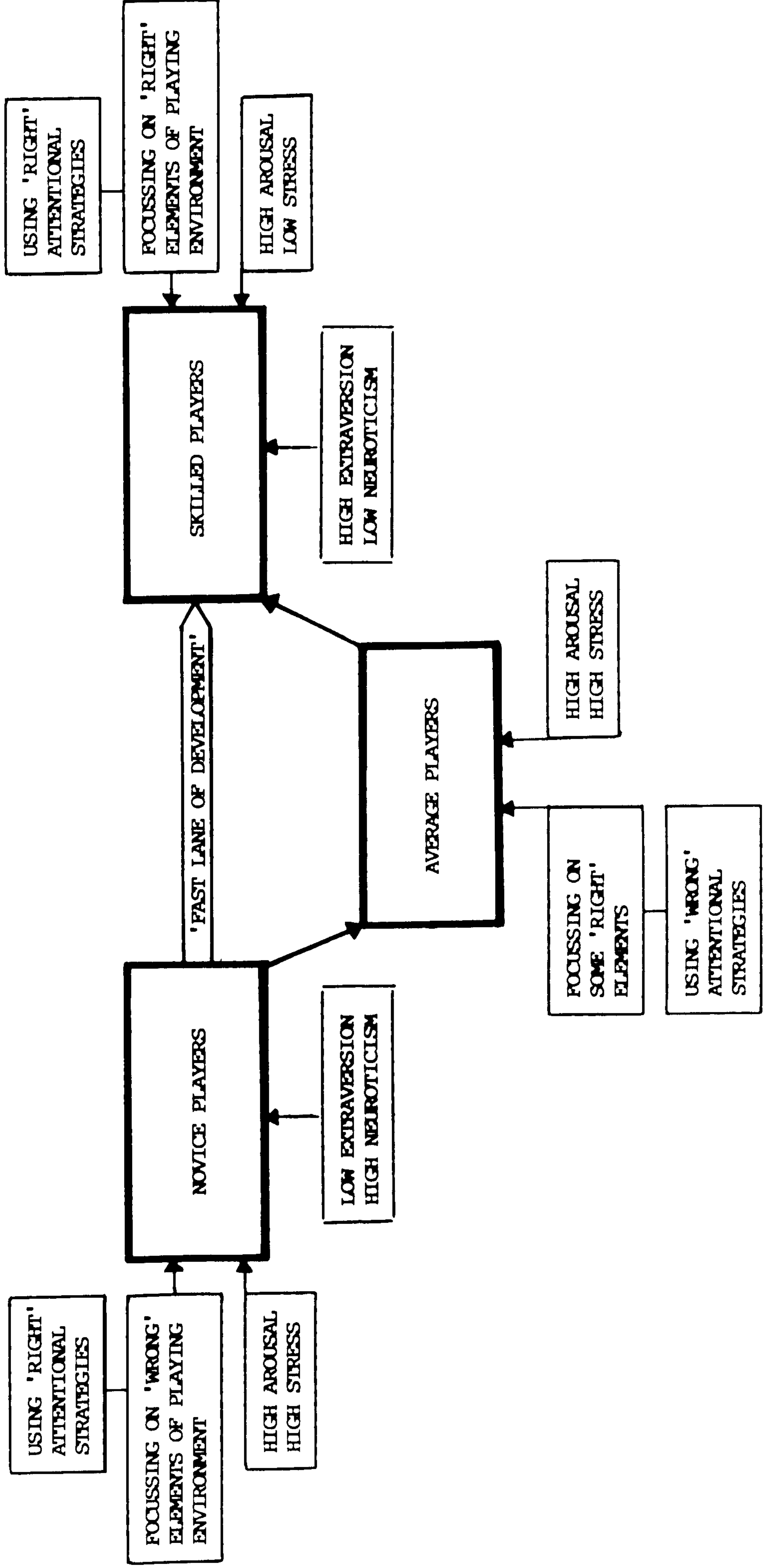


FIG. 10. MODEL SHOWING THE INTERACTION OF COGNITION AND MOOD WITH SQUASH TASK PERFORMANCE

CHAPTER 5

STUDY 3: SELF-REPORTED MOOD IN COMPETITIVE SQUASH

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CHAPTER 5**STUDY 3: SELF-REPORTED MOOD IN COMPETITIVE SQUASH**

INTRODUCTION

The research strategy in Study 2 was strongly influenced by the suggestions of Whiting (1972), Martens (1979) and Glencross (1978), who argued that experimental investigation techniques should be attempted in applied field situations which have strong "ecological" validity. Even though in Study 2 attempts were made to simulate actual playing conditions, it became obvious that the experimental methodology was still failing to really draw out the complexities of individual behaviour in competitive sport. Glencross (1978 p. XII) has insisted that researchers concerned with the study of psychology and sport should endeavour to select procedures, techniques and methods that were suitable for the investigation of complex interacting variables that relate to highly skilled subjects in complex situations.

In response to this challenge, it was decided to study players' psychological reactions under competitive tournament conditions. This was the theme of the third stage in the research strategy, where simulated squash tournaments were specially set up to permit players' psychological reactions to be monitored. A major concern in the arrangement of these tournaments was the issue of validity in simulation research. The points made by Bem and Lord (1979) and Monahan and Loftus (1982), discussed earlier, along with Tunnell's (1977) dimensions of naturalness (i.e. natural behaviour, setting, and treatment), were given priority. In order to obtain accurate and valid data it was crucial to ensure that all the "normal" features of competition were encompassed in the simulations.

The present study set out to examine psychological responses in relation to success in competitive squash. It was thought that under "real" (ecologically valid) competitive conditions, differences in psychological states and responses between successful ("winners") and

unsuccessful players ("losers") might be revealed.

Previous work in Studies 1 and 2 suggested that squash players would be characterised by high levels of arousal during play, although not showing any physiological signs of anxiety before play, and that skilled subjects might possibly be characterised by more moderate levels of stress than average and novice players. With respect to self-reported mood, the results from Study 2 indicated that different mood responses, depending on the skill level of the subjects, were induced during the squash experiment. Throughout the experiment, the skilled group reported low stress accompanied by high levels of arousal. The average and novice groups, however, experienced constantly high levels of arousal, with greater discrepancy, pre and post experiment, between preferred and felt arousal, along with high levels of reported stress. These psychological responses may be tied in with findings from Study 1, which showed that many of the novice players, in particular, continued with arousing strategies as an attempt at arousal modulation even when these strategies were unsuccessful.

In this study, it was hypothesised that a difference in response would occur between those players who became successful and those who became unsuccessful, mood being responsive to the changing person x situation interaction (Cox, 1985). It was further hypothesised that the winners would maintain high levels of arousal and constant but not increased levels of stress, while losers would find the experience increasingly unpleasant, reflected by increasing stress scores. This hypothesis was supported to some degree by the findings of previous research work carried out by Sanderson and Gilchrist (1982). They had examined the anxiety (unpleasant high arousal) responses of competitive squash players and shown that the post-match anxiety scores of winners fell significantly ($p < 0.001$) while losers' post-match anxiety scores increased significantly ($p < 0.05$).

Results from Study 2 had also shown that differences existed between ability groups in personality variables and attentional strategies. For example, the personality scores of skilled and novice

players differed in a consistent pattern on a number of subscales across different tests. In addition, tentative conclusions about the attentional strategies of the skilled and novice players were proposed on the basis of differences that were found in attentional style between skilled and novice players when compared with average players. It was thought that these personality and attentional factors might well play an important role in the interpretation of psychological processes involved in competitive squash play. Hence, measures of personality and attentional style were also administered to subjects in this study.

METHOD

Three special squash tournaments were set up for skilled club, county and national under-19 level squash players in which they played against opponents of similar ability. These tournaments, organised by a third party, were held both in familiar squash surroundings and under normal competitive conditions (e.g. tournament play was controlled by experienced "markers"). As is usual in such tournaments, players received travelling expenses and cash prizes were awarded to the tournament finalists.

Subjects

The subjects (n=30) who took part in this investigation were squash players specially recruited by independent squash experts. To ensure that playing ability remained relatively constant, players were approached individually and asked to participate in a squash tournament. There were three different groups, each group consisting of ten male squash players of similar ability. Players in the first group were recruited from clubs in the Nottingham area and were involved in regular competitive play in the city squash leagues. The second group competed at a higher level in county teams in the North Midlands area. The third group was made up of England under-19 players involved in

regular competition, training and practice as members of the English national under-19 squad. This group was significantly younger ($F_{2,27}=5.51, p=0.009$) when compared to club players and county players. All subjects played squash more than twice per week.

Design

As with the previous study, a factorial design was employed, but on this occasion subjects were "blocked" according to performance (winners and losers). The independent variables afforded by this design were (1) winners versus losers, (2) games and, for mood means, (3) pre-post.

Measures

The Stress-Arousal Checklist (SACL; Mackay et al., 1978; Cox & Mackay, 1985) and the Telic State Measure (TSM; Svebak & Murgatroyd, 1985) were used to provide ongoing situational information about possible mood changes. In addition, the Telic Dominance Scale (TDS; Murgatroyd et al., 1978), and the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975) were used in an attempt to provide a picture of consistent behavioural characteristics. The Test of Attentional and Interpersonal Style (TAIS; Nideffer, 1976) was also included to attempt to pinpoint any differences which might occur in attentional functioning.

Procedure

In each of the three independent tournaments, two standard-sized squash courts with the regulation markings were used. The courts, situated in private squash clubs, were specially chosen because the court area could be conveniently divided off from the rest of the club, allowing the tournaments to be conducted in an uninterrupted manner.

Although a quiet sitting room was available for players if required, players not on court were not restricted from watching their opponents in other games. This was thought to be a normal part of tournament behaviour and would help to make the event more realistic. Access to the squash courts was by the usual way of a door situated in the back wall of the court. Opposite the entrance to each court, tables and chairs were positioned to allow subjects to complete the state measures (SACL and TSM) in relative comfort just prior to entering and just after leaving the court (i.e. just before and just after each game).

Each tournament consisted of two leagues of five players who played one match against every other player in that same league (i.e. four games per player). Matches followed "American scoring", with players able to score successfully on either player's service. The first player reaching 15 points was the winner. American scoring was chosen in order to increase the competitiveness of play, keep the games and tournament progressing smoothly, without long games and therefore delays, and also to provide a good basis for obtaining performance measures. Game scores were totalled and the players who scored most points in each league progressed to the "final" match. The overall winner and runner-up received cash prizes.

On arrival, subjects completed the TDS, the EPQ, and the TAIS, administered on a group basis. Following this, subjects were informed of what was required in the tournament, the use of the SACL and the TSM was demonstrated and, for practice purposes, subjects were given a chance to complete both measures.

After changing into squash "kit", players were allowed time to warm up in their individual ways. This generally involved stretching exercises and practising shots on court against another player. Players were permitted to use their own racquets, but "yellow dot" squash balls were provided by the tournament organisers. Matches were "refereed" by experienced squash markers and the scores from the various matches recorded and posted on a scoreboard, allowing players the opportunity to check their progress as the tournament proceeded. In an attempt to

recreate realistic competitive squash conditions, the tournament itself was controlled by the markers, who announced the sequence of games (order of play) and called opposing players onto court. Before the start of play, subjects were allowed a further two minutes "knock-up" against their particular opponent in that game. At the end of the tournament a debriefing session was held and the cash prizes distributed.

RESULTS AND COMMENTARY

Following scoring, the data were statistically analysed using appropriate ANOVA techniques. No significant differences between groups were obtained from any of the initial mood measure scores, or from the attentional and personality measures of participants (i.e. club, county and England under-19 players) in the three separate tournaments.

The data were then collapsed across groups, and subsequently the most successful ("winners") and least successful players ("losers") were identified on the basis of their final points score. This strategy allowed two groups of seven players to be established from the overall subject pool (n=30).

"Winners and losers" personality (EPQ, TDS), attentional style (TAIS) and performance

Differences in scores on Eysenck's neuroticism scale between the two groups were significant ($F_{1,12}=4.83$, $p<0.05$), with winners (Mean=8.4, SD=3.3) scoring lower than losers (Mean=13.4, SD=5.1) (see Table 18). No significant differences between winners and losers were obtained on any of the Nideffer TAIS personality subscales, as shown in Table 18. Neither were any significant differences obtained between winners and losers in TDS subscale scores (seriousmindedness ($F_{1,12}=0.00$, $p=ns$), planning orientation ($F_{1,12}=2.65$, $p=ns$) and arousal avoidance ($F_{1,12}=0.01$, $p=ns$)), or in terms of overall telic dominance

($F_{1,12}=0.58$, $p=ns$) (see Appendix C, Table C.5.1). Significant differences were obtained between winners and losers on two of the TAIS attentional style subscales (see Appendix C, Table C.5.2). Losers (Mean=19.7, SD=4.2) scored significantly higher ($F_{1,12}=6.17$, $p=0.03$) on broad internal attentional focus than did winners (Mean=15.1, SD=2.4). Similarly, losers scored significantly higher ($F_{1,12}=4.39$, $p=0.05$) on information processing (Mean=45.0, SD=8.0) than did winners (Mean=35.1, SD=9.5).

TABLE 18. Mean personality subscale scores for winners and losers.

PERSONALITY SUBSCALES	WINNERS	LOSERS	$F_{1,12}$
EYSENCK EXTRAVERSION	16.1 (SD=2.5)	15.9 (SD=2.8)	0.04 $p=ns$
EYSENCK NEUROTICISM	8.4 (SD=3.3)	13.4 (SD=5.1)	4.83 $p<0.05$ *
EYSENCK PSYCHOTICISM	4.3 (SD=2.1)	5.3 (SD=2.7)	0.59 $p=ns$
NIDEFFER EXTROVERSION (EXT)	27.9 (SD=4.3)	32.1 (SD=8.2)	0.24 $p=ns$
NIDEFFER INTROVERSION (INT)	19.6 (SD=2.9)	21.0 (SD=3.5)	0.68 $p=ns$
NIDEFFER SELF ESTEEM (SES)	21.4 (SD=4.7)	21.6 (SD=4.7)	0.003 $p=ns$
NIDEFFER OBSESSIVE (OBS)	16.6 (SD=3.2)	16.7 (SD=6.9)	0.002 $p=ns$
NIDEFFER DEPRESSION (DEP)	7.7 (SD=3.4)	8.1 (SD=2.5)	0.07 $p=ns$
NIDEFFER PHYSICAL ORIENTATION (P/O)	18.3 (SD=2.5)	19.1 (SD=2.1)	0.48 $p=ns$
NIDEFFER POSITIVE AFFECT EXPRESSION (PAE)	19.9 (SD=1.9)	22.0 (SD=3.2)	2.39 $p=ns$
NIDEFFER NEGATIVE AFFECT EXPRESSION (NAE)	13.9 (SD=8.9)	15.4 (SD=6.2)	0.15 $p=ns$

* $p<0.05$

The overall difference between performance means, was significant ($F_{1,12}=107.3$, $p<0.0001$) with, as would be expected, winners (Mean=14.9, SD=1.1) scoring significantly higher than the losers (Mean=9.5, SD=5.6) and was consistent across games (as shown in Fig. 11). There was no games x group interaction.

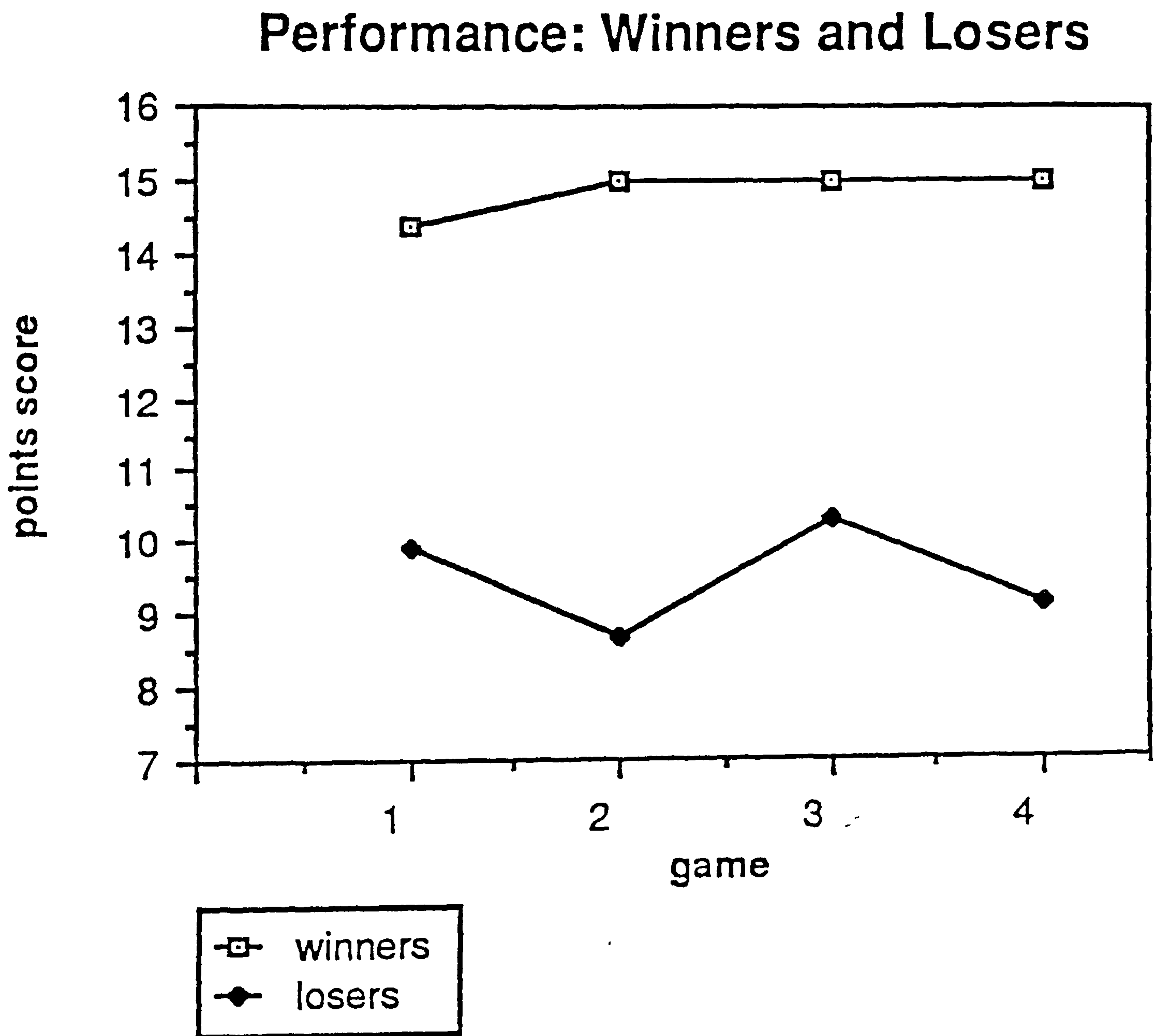


Fig. 11. Showing mean performance scores for winners and losers during the squash tournament.

"Winners and losers" self-reported mood (SACL)

Arousal

There were significant effects of group ($F_{1,12}=4.67$, $p=0.05$) and games ($F_{3,36}=9.46$, $p=0.0001$) on arousal scores, and also an important interaction between group and games ($F_{3,36}=6.78$, $p=0.001$). Winners' arousal scores were higher overall and a difference in their pattern of arousal scores, in comparison with losers' scores, was obtained. Subsequent analysis revealed that the arousal scores of the winners did not change significantly across games ($F_{3,36}=0.34$, $p>.ns$) but those of the losers did ($F_{3,36}=5.77$, $p=0.001$). There were significant differences between the groups' scores on game 3 ($F_{1,12}=6.93$, $p=0.02$) and on game 4 ($F_{1,12}=9.25$, $p=0.01$). This effect is described in Fig. 12. Means and standard deviations of winners' and losers' arousal scores are provided in Appendix C, Table C.5.3.

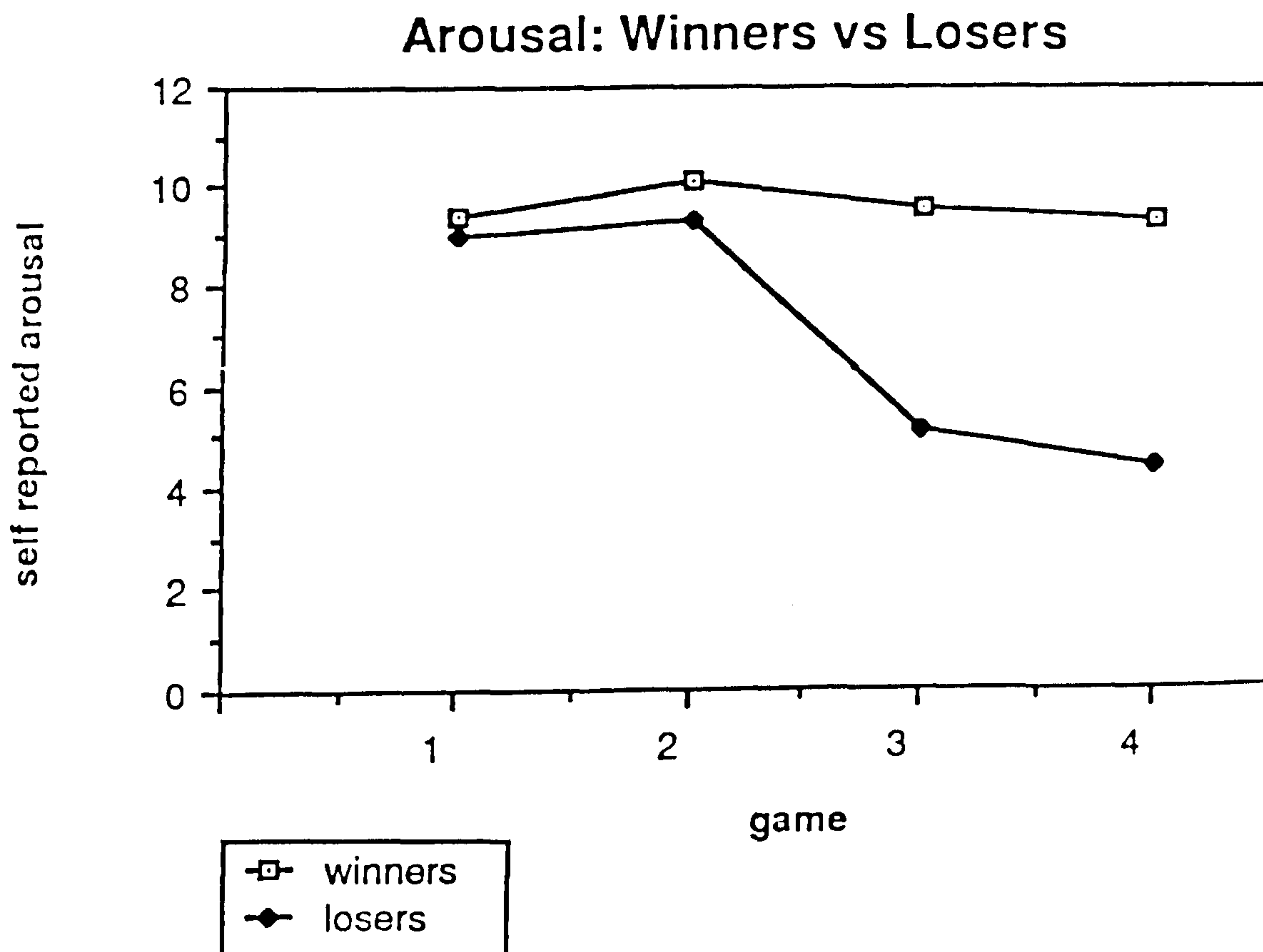


Fig. 12. Showing winners' and losers' mean arousal (SACL) scores at the four games of the squash tournament.

Stress

Two interaction effects on stress scores proved of interest: (1) that between group and games ($F_{3,36}=2.46, p<0.07$); and (2) that between group and time of testing (pre and post game) ($F_{1,12}=7.41, p=0.02$). The stress scores of the winners remained at a constant and moderate level throughout the tournament ($F_{3,36}=0.15, p=ns$). Those of the losers changed ($F_{3,36}=4.73, p=0.007$): initially they were higher, but they declined after game 2. The most reliable effect was that of group x time of testing (see Fig. 13). Essentially, the winners' stress scores significantly decreased across games ($F_{1,12}=6.48, p=0.03$) while those of the losers' did not ($F_{1,12}=1.70, p=ns$). (See also Appendix C, Table C.5.4 for winners' and losers' means and SD's pre and post game stress).

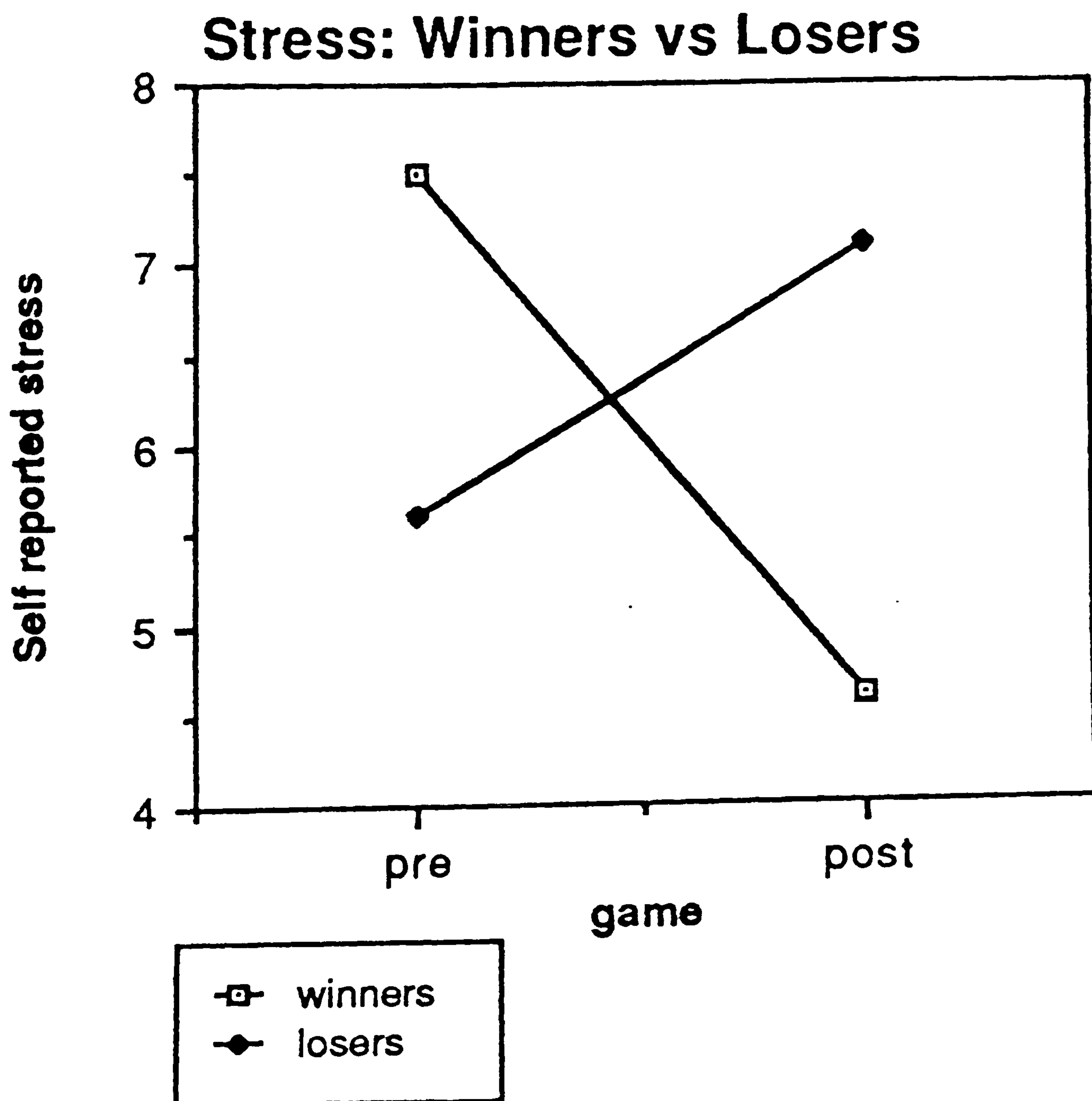


Fig. 13. Showing mean pre and post game stress (SACL) scores for winners and losers (MERGED OVER ALL GAMES)

"Winners and losers" self-reported mood (TSM)

Differences between winners and losers were found to be non-significant (with one exception) on the first three TSM items: (1) serious-playful ($F_{1,12}=4.07$, $p=ns$); (2) planning-spontaneous ($F_{1,12}=0.74$, $p=ns$); (3) level of felt arousal ($F_{1,12}=0.82$, $p=ns$). The exception concerned post game 2 scores on the seriousminded item (1) of the TSM: losers (Mean=4.22, SD=1.09) scored significantly higher ($F_{1,12}=7.12$, $p=0.02$) than winners (Mean=2.77 SD=1.20). The losers' mean score here indicates that relatively more of these players were in the paratelic state than in the telic state. Their mean seriousmindedness scores for the remaining games of the tournament (i.e. approximately 3.5) suggests that losers were balanced in their responses across both telic and paratelic states. In general, the mean seriousmindedness scores of winners indicate that a greater number were in the telic state than the paratelic state, before and after games throughout the tournament. (See also Appendix C, Tables C.5.5 to C.5.9 for means and standard deviations).

Preferred arousal

Results from item 4, which measures preferred level of arousal, indicated that there were no differences between winners and losers overall, but the effect of games was significant ($F_{3,12}=3.07$, $p=0.04$). Also, a decrease effect in level of preferred arousal pre to post game was significant ($F_{1,36}=4.61$, $p=0.05$) for all. Analysis of these changes in preferred scores shown by each of the groups revealed significant effects (see Table 19): $F_{3,36}=3.92$, $p=0.02$ (winners); and $F_{3,36}=3.13$, $p=0.04$ (losers).

TABLE 19. Showing mean scores on preferred arousal (TSM) for winners and losers at games 1 to 4.

GAME	WINNERS	LOSERS
1	4.5	3.9
2	3.9	3.8
3	3.6	4.1
4	4.0	4.6
$p<$	0.02	0.04

Discrepancy score (preferred minus felt arousal)

The results on item 5, the discrepancy score, showed that winners' scores did not change significantly across games but that losers' scores did ($F_{3,36}=3.84$, $p=0.017$), as shown in Fig. 14. In addition, although not significant, a trend in group x games interaction was apparent ($F_{3,36}=2.53$, $p=0.073$).

Arousal Discrepancy: Winners vs Losers

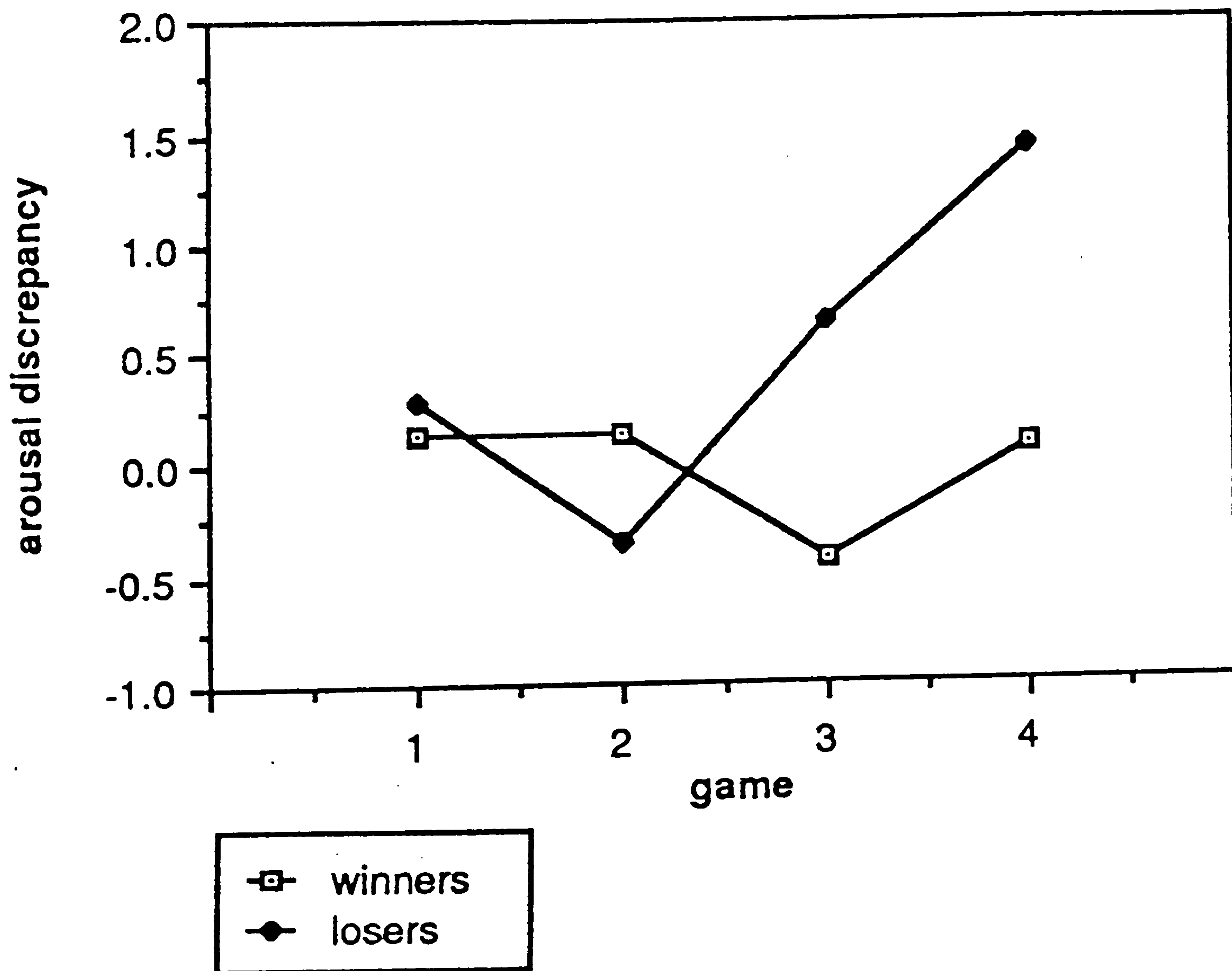


Fig. 14. Showing mean arousal discrepancy scores for winners and losers at the four games of the squash tournament.

DISCUSSION

It seems that, in this study at least, and in spite of age differences, squash players who play the game competitively in teams at club, county or national level are similar with respect to enduring personality characteristics and attentional style (as measured by EPQ, TDS and TAIS). However, when the personality and attentional characteristics of winners and losers were examined, losers were found to score higher on neuroticism (EPQ), a finding which tends to support results from Study 2, in which skilled players scored significantly lower on neuroticism than novice players. In addition, it confirms the trend identified by Eysenck, Nias and Cox (1982) of "outstanding" sports performers scoring low on neuroticism. Both winners and losers also exhibited high extraversion, in common with the skilled players in Study 2 and previous findings also reported in Eysenck, Nias and Cox (1982).

Losers also scored significantly higher than winners on broad internal attentional focus (BIT) and information processing (INFP) (TAIS). The TAIS questions which contribute to scores on these subscales were separated out and examined with a view to identifying the reasons why these dimensions might distinguish between success and failure in squash. After examination of the BIT and INFP subscale questions, one cautious but plausible explanation is that, during competitive play, losers worked to fixed strategies with little processing of ongoing information and were therefore, like the average players in Study 2, not very adaptable. Conversely, winners were possibly less restricted on input and able to allocate more attention to the ongoing changing situation, allowing them more flexible responses to the demands of play. Support for this argument was provided by the results from Study 2 which suggested that skilled players, when compared to novice players, may be better at attending to the "correct" aspects of play. However, it should be emphasised that previous work carried out using the TAIS has not always produced

results which distinguish between successful and less successful sports performers (e.g. Jackson, 1980; Aronson, 1981; Van Schoyck & Grasha, 1981).

Given that the players in each group were matched according to playing ability, it would seem that playing performance could have an important effect on the ongoing psychological reactions of players at this level. Generally, arousal levels were high. Throughout the tournaments, the winners achieved and maintained higher arousal levels than the losers overall. Closer examination of the arousal and stress (SACL) data revealed that game 2 appeared to have been a "crucial game", with the outcome (i.e. winning or losing) affecting the arousal and stress levels of losers in games 3 and 4, where levels became significantly lower than those of the winners. Although differences in stress levels between winners and losers were non-significant at individual games, losers' stress levels varied significantly across games. The pattern was one where winners' stress scores remained relatively constant, while losers' stress levels were much more variable, with a considerable change taking place after game 2.

The only significant difference between winners and losers on TSM item measures occurred after game 2, with losers scoring significantly higher (i.e. at the paratelic end) on the seriousmindedness item (item 1). This item is said to be the best reflection of operative metamotivational state, and has been chosen in some studies as the sole indicator of the telic state. The implication is that not only were the more extreme psychological reactions of losers registered in the SACL scores, but also on this single TSM item score. These different psychological reactions were also reflected in levels of preferred arousal (TSM), and particularly in the discrepancy scores (TSM, item 5) as the tournament proceeded. This effect is clearly illustrated in Fig. 14.

Although the levels of preferred arousal changed significantly for both winners and losers across games, losers' discrepancy scores increased significantly, while winners' discrepancy scores did not. In

other words, as the tournament progressed, the difference between the level of arousal experienced by losers and the level that they desired increased significantly. The positive discrepancy scores after game 2 suggest that losers at this stage would have preferred much higher levels of arousal than they actually experienced. By contrast, for winners, where for game 3 discrepancy in felt and preferred arousal trends were reversed, in general, discrepancy scores were smaller and more consistent.

Reversal theory proposes that a discrepancy between preferred levels and actual levels of felt arousal would lead to negative hedonic tone (unpleasant), which is likely to give rise to tension and be experienced as tension-stress. In addition, the effort required to overcome the discrepancy in arousal levels gives rise to the experience of effort-stress. As we have seen above, the discrepancy in losers' preferred and felt arousal scores increased as the tournament proceeded. This suggests that losers, but not winners, were experiencing tension-stress brought about by the discrepancy in arousal levels. It seems likely that losers, although perhaps attempting to reduce this discrepancy and therefore tension-stress, continued to be unsuccessful and consequently arousal discrepancy (and therefore tension-stress) continued to increase. A possible consequence is that losers were also likely to have experienced effort-stress brought about by their attempts, both physical and psychological, to redress the balance (i.e. cope) (Apter & Svebak, in press). Of interest in the present context is Apter and Svebak's argument that effort may be required for a second purpose, that of keeping attention on the task at hand even though the situation (i.e. losing) is unpleasant.

It is possible that, although the felt and preferred arousal scores may change independently, a situation could occur where the discrepancy score does not change (meaningfully), but hides large differences in felt and preferred arousal. Felt arousal did not change significantly over the tournament. The results from the SACL measures are fairly consistent with this pattern of response: effectively little change occurred in the winners' arousal scores, but some reduction in

losers' arousal occurred after game 2. Therefore, the preferred arousal scores must have changed to produce a change in the arousal discrepancy scores, and in fact they did. There appeared to be a relatively consistent decrease in the preferred arousal scores of winners and an increase in those of losers.

Winners showed lower and more consistent levels of arousal discrepancy than losers (see Fig. 14) and, as a result, winning was likely to have been experienced as pleasant. It also seems likely that any tension-stress experienced by winners was minimal, and the consequent effort-stress not realised.

In trying to explain these mood changes, it seems possible that, while players could perhaps afford to lose the first match, losing a second one would mean that the possibility of reaching the final became highly unlikely. Conversely, those players who had won their first two games had an excellent chance of reaching the final, although success in game 3 may have been more crucial for winners (as reflected by the discrepancy scores), since any mistake at this stage would again have probably ended their chances of progressing to the final. The psychological reaction of the losers (especially after game 2) therefore appears to be reflected in the changes in their stress and arousal scores. A more complete discussion of the arousal discrepancy results is undertaken in the light of other reversal theory concepts (e.g. the mastery-sympathy metamotivational pair) in Chapter 6.

In addition, winners' stress levels post game were significantly lower than pre game levels, again suggesting that the outcome of the game, in this case winning, was likely to have been experienced as pleasant, causing a significant decrease in reported stress. Interaction effects from the SACL scores highlight the differences found in the pre and post game psychological characteristics of winners and losers. For example, the interaction effect between arousal levels measured before and after games for winners and losers was significant. Also, an interaction effect was obtained between winners and losers overall for pre and post game stress levels.

The differences between winners and losers highlighted in the results of Study 3 have been summarised in the model shown in Fig 15.

SUMMARY

In conclusion, the use of simulated squash tournaments in which the subjects played against opponents of similar ability allowed psychological reactions to the ongoing changes in the game to be measured under realistic conditions. By concentrating on those players who were successful (winners) and those who were not (losers) it was hoped to identify differences in players' psychological reactions which might point to the reasons for and the responses to their success or failure.

It seems clear from the results of this investigation that success at playing squash over a series of games in a tournament is very much concerned with ongoing changes in the pattern of stress and arousal levels. Successful players are especially skilled at maintaining consistently high levels of arousal.

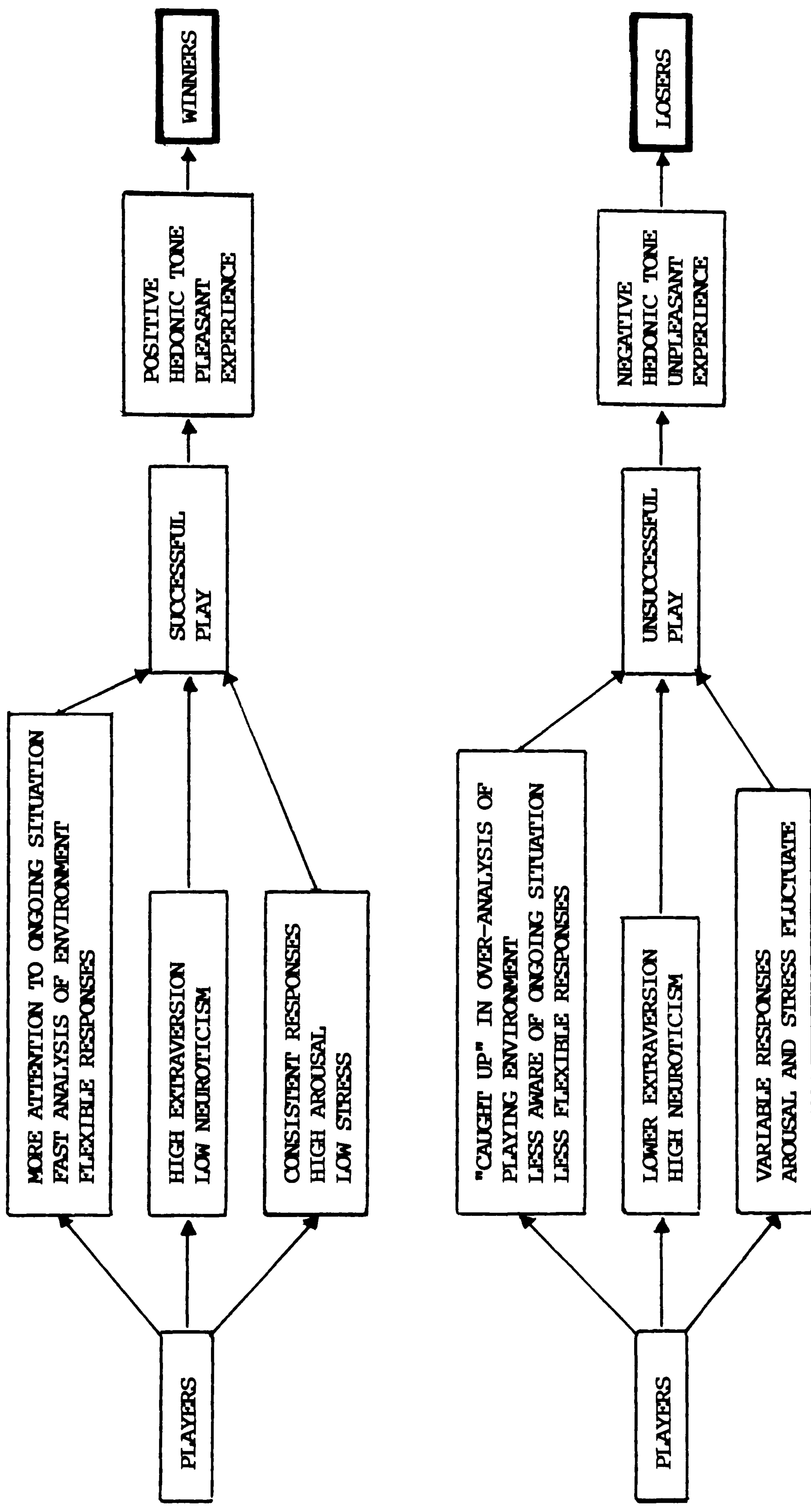


FIG. 15. MODEL SHOWING PSYCHOLOGICAL ELEMENTS IN TOURNAMENT SQUASH.

CHAPTER 6

DISCUSSION AND CONCLUSIONS

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CHAPTER 6**DISCUSSION AND CONCLUSIONS**

INTRODUCTION

This chapter is concerned with the overall findings of this thesis. These are discussed in the light of the theoretical approaches suggested in Chapter 1 as possible alternatives to optimal arousal theory interpretations of the arousal-performance relationship in sport. Finally, an attempt is made to formulate a tentative model of psychological effects involved in competitive squash.

The main aim of this thesis was to examine psychological factors affecting performance in squash. Of particular interest was the role of arousal, its interaction with stress, and the relationship of both to elements of performance such as psychological preparation, attention, and prevailing mood states. A number of different techniques were used to elicit information from squash players at different levels of experience and ability. These techniques included a questionnaire survey, a laboratory type study of squash skill performance, and the use of simulated squash tournaments.

The chapter begins by reviewing the overall research strategy and the main findings of the investigation, attempting to set them in the context of theoretical argument and the reality of the game of squash. In order to move towards an understanding of the competitive process in squash in terms of reversal theory, a discussion is then undertaken which highlights some of the problems and questions, both practical and theoretical, which arose as a result of this investigation. Finally, a tentative model summarising the psychological processes involved in competitive squash is drawn up, along with a summary of coaching recommendations which may act as guidelines for the speedy transition of novices via the "fast lane of development" to the ranks of the successful players.

EFFECTIVENESS OF RESEARCH STRATEGY

The research strategy adopted in this investigation was comprised of three stages, each of which was a separate but inter-related part of the overall study. This three-stage strategy examined psychological preparation prior to competition and on-going psychological strategies during play, and psychological reactions of players to the demands of squash skill performance, and to competitive play. Each individual study was designed with the theoretical arguments about the nature and validity of sports psychology research, outlined in Chapter 2, under strong consideration. Of particular importance, especially in Studies 2 and 3, was the notion of ecological validity, and a good deal of attention went into ensuring that the three dimensions of naturalness (Tunnell, 1977) were satisfied and the impact of the experiments on subjects in Studies 2 and 3 minimal.

In general terms, the research strategy was successful. The different research techniques utilised in each of the three studies enabled accurate information about the psychological processes involved in competitive squash to be collected. This in turn allowed a more complete picture of the complexities of competitive squash play to be assembled. One especially pleasing aspect of the research strategy was the effectiveness of the simulated squash tournaments. These tournaments ran exceptionally smoothly and, based on the committed play of subjects, the enthusiastic participation of the organisers and the results obtained, it was thought that they had been particularly effective in achieving their purpose. All this was taken as an indication that the simulations had encompassed all the "normal" features of competition.

One of the additional features of the research strategy was the deliberate use of subjects of different ability levels, categorised with the assistance of experienced squash coaches with a personal knowledge of the respective players. Ability grouping allowed easy comparison, and was done to draw out any differences in psychological

functioning that might be associated with varying levels of ability. Overall, the players taking part ranged from novices or beginners to highly skilled and experienced players. These ability classifications were confirmed in Study 2, for example, on squash task performance, where skilled players scored well above the average and novice players. Ability groupings were used differently in Study 3, but performance, in the form of tournament game results, was taken as the selection criteria for membership in the winners or losers group whose psychological scale results were subject to analysis. The results of this study, along with those of Studies 1 and 2 are discussed in the following sections.

PSYCHOLOGICAL PREPARATION FOR SQUASH

Approximately half the players questioned in Study 1, the survey-based research, reported using some form of psychological preparation before games. Fewer average and novice players used psychological preparation than skilled players. The fact that skilled players had been playing longer and more frequently than the other players might have been related to the development of their psychological preparation strategies.

Generally, players reported experiencing few anxiety symptoms, although many were dissatisfied with their pre-game state. Eighty-five percent of the players who did prepare did not use arousal reducing or calming strategies (see also Sanderson & Gilchrist, 1982). The planning or cognitive dimensions of preparation were most important for the skilled and average groups. Relatively more average and skilled players than novice players were concerned about concentration and attention in planning aspects of play. Arousing strategies were the main concern of many of the novice players who attempted to prepare and who, even when these strategies were unsuccessful, continued to use them (see also Baroga, 1973). Thus, for the novice players, arousal seemed to be uncontrolled and undirected. The skilled and average players

concentrated on other performance factors as part of their preparation strategies.

While the squash questionnaire did elicit much useful information, it would have been worthwhile to have added the Eysenck and Eysenck (1975) personality scale (EPQ) and Nideffer's (1976) attentional style subscales (TAIS) for completion by the subjects in this study. For instance, it might have been advantageous to have examined players' psychological preparation strategies in relation to their scores on the attentional style subscales.

ATTENTIONAL STRATEGIES AND PERFORMANCE

It was decided to include the Nideffer TAIS (Nideffer, 1976) in Studies 2 and 3. This questionnaire (see Chapters 1 and 2) purports to measure attentional dimensions which are related to effective performance, including width and direction of attentional focus (Easterbrook, 1959; Watchel, 1967).

In both Studies 2 and 3, differences in respective squash group means were identified on two of the TAIS attentional subscales, broad internal attentional focus (BIT) and information processing (INFP). In Study 1, skilled and novice players scored similarly and significantly lower on the BIT and INFP subscales than did average players. In addition, these two groups produced similar and significantly higher means than the average group on another attentional subscale, reduced attentional focus (RED). Attentional subscale data collected as part of Study 3 indicated that the winners group scored significantly lower on both the BIT and the INFP subscales than did the losers group.

In an attempt to explain these findings, the tentative arguments presented in Chapter 4 suggested that, different from average players, skilled and novice players used similar information processing and attentional strategies. Following Nideffer's description of the

subscales, skilled and novice players might perceive the environment as less "busy" and be more able to concentrate on particular environmental demands, than average players. Average players might still be preoccupied by the general environment and might become so "wrapped up" in what was happening or about to happen that they become unaware of changing environmental conditions. Skilled and novice players might well be better at narrowing attention when necessary, and more aware of changing environmental circumstances. A further suggestion was that when skilled and novice players do focus down, as evidenced by their superior performance, the skilled players might have learned through practice and experience to do so on the "correct" features of play.

It was further suggested that novice players might well share the attentional strategies necessary for successful squash performance with skilled players, but might not have yet discovered or learned which elements of the game to focus down on. Evidence from Study 1 indicated that novice players needed to concentrate more on planning and cognitive aspects in preparation strategies. Consequently, if novices could learn or be taught how to concentrate on these aspects prior to and during play, while maintaining the attentional strategies which they apparently have in common with skilled players, they might well develop along what, in Chapter 4, was called "the fast lane" into skilled players. Alternatively, if the novice players changed their strategies to those used by average players, for example, it seems likely that they, while enjoying some improvement and success, would be less likely to develop into skilled players.

In Study 3, when club, county and England under-19 players were compared, no significant differences between group means were obtained on any of the Nideffer attentional subscales. However, when the winners and losers groups were separated, winners scored significantly lower than losers on both the broad internal attentional (BIT) and information processing (INFP) subscales. In line with the arguments above, evidence from the BIT and INFP subscale scores suggests that losers, in a similar way to the average players in Study 2, might be

less able to concentrate on specific environmental demands. They might be caught up in over-analysis or distracted by what is happening in the general environment and be less aware of changing environmental conditions during competitive play. Conversely, winners might be more aware of and able to allocate more attention to the changing game situation and, when required, be better at narrowing attention on specific features of the game. Such strategies might thus allow winners more flexible responses to the demands of play than losers, who may work to more fixed strategies. Given the data obtained from Studies 2 and 3, these explanations, while cautious, seem plausible. It must be said, however, that these tentative arguments do not completely match up with Nideffer's (1977) attentional categorisations for athletes.

The explanation offered above endeavoured to explain the results in the light of what was required during the performance of the squash task and in the wider context of competitive play in squash. The line of argument was put forward after careful examination of Nideffer's subscale descriptions and the actual content of the questions scoring on those particular subscales which differentiated between skilled and novice players in Study 2, and winners and losers in Study 3.

Although Nideffer's (1976) TAIS has received some prominence in sports psychology literature, previous research results from sports populations have been ambiguous (e.g. Landers & Courtet, 1979; Landers, Furst & Daniels, 1981) and, like most such scales, it is not without its weaknesses. Apart from obvious criticisms about attempting to gather information in connection with a complex cognitive process like attention, known to involve unconscious automatic processes, by using a self-report scale, other more specific criticisms can be leveled at Nideffer's approach. Van Schoyck and Grasha (1981) have raised a number of theoretical and methodological questions with regard to the TAIS and work carried out using the instrument which are relevant to this discussion. They point out that the characteristics of the concept of attentional style, as described by Nideffer (1976), are compatible with a relatively stable trait. As a result, the attentional subscales of

the TAIS do not adequately take into account situational determinants of attentional style. In addition, the individual questions on the TAIS are not situation-specific. The questions refer to everyday situations and are not directly related to sport. In an attempt to overcome this problem, Van Schoyck and Grasha (1981) developed their own sport-specific modified TAIS measure for use in tennis.

The other results from this investigation which concentrated on psychological states, specifically squash players' arousal levels prior to and during performance and play, did not support Nideffer's (1976) theoretical stance. His position is linked to the inverted-U hypothesis explanation of the relationship between arousal, attention and performance. As a result, high arousal is thought to interfere with the sports performer's ability to shift attentional focus, causing an involuntary narrowing of attention and a decrement in performance. All subjects in both Studies 2 and 3 reported high levels of arousal, as measured by the SACL instrument, yet all the indications were that play was unrestricted and of a high standard. High arousal, as shown by the mood response data, was an obvious feature of competitive squash play.

In this thesis, two of Nideffer's attentional subscales, BIT and INFP, were sensitive to differences in attentional style between groups of differing ability in squash. Tentative explanations have been presented which attempted to link those results to what takes place during competitive squash play. However, the ambiguous results in previous TAIS sports-based research have led to some doubt about the theoretical soundness of Nideffer's arguments. If they are correct, then they need to be directly supported by research evidence from within and across a comprehensive range of sports. It needs to be clearly shown that specific attentional strategies or style requirements are crucial to superior performance in a variety of different sports. Until this task has been completed, confidence in the effectiveness of Nideffer's scale in the sports context must remain low.

PERSONALITY IN SQUASH

Personality measures were included in the present research investigation on the basis of evidence from previous research (see Chapter 1) which had shown that there might be differences in the more enduring features of sports performers' personality and, in addition, that these enduring features might have an influence on the performance of sports skills or on the psychological responses of sports performers during competitive play. The two Eysenck personality measures, EPI (Eysenck, 1964) and EPQ (Eysenck & Eysenck, 1975) and the TDS (Murgatroyd et al., 1978) were used, along with personality subscales from Nideffer's TAIS (Nideffer, 1976), to assess personality in this investigation. The results obtained with the three instruments are discussed below.

Eysenck personality measures (EPI, EPQ)

In view of the similarity between skilled and novice players in their scores on Nideffer's attentional subscales, the personality scores of these two groups were compared in an attempt to identify differences in personality which might be linked to their obvious differences in ability. Average players' personality scores were not included in this comparison.

Skilled players in Study 2 obtained significantly higher extraversion scores and significantly lower neuroticism scores than the novice players in the same study. It should be said that the mean extraversion scores of the novice players, although lower than the mean scores of the skilled players, were still quite high, and compatible with the scores quoted for non-squash sports populations in other sports studies. These results are in agreement with previous findings from personality studies of sports population using the EPI and EPQ. For example, physical education students have consistently produced high mean extraversion scores and average mean scores on neuroticism

(Brooke, 1967; Eysenck & Eysenck, 1975; Eysenck, Nias & Cox, 1982). Also, two independent studies, one carried out on the British athletics team, and another which tested Olympic athletes and included a large control group (both cited in Eysenck, Nias & Cox, 1982), produced similar above-average scores for extraversion. Neuroticism scores in the first study were about average, but in the second study were lower than those of the control group.

The club, county and England under-19 players involved in the three tournaments in Study 3 exhibited no significant differences in group means on any personality measures. Although their extraversion scores were close to those of the skilled players in Study 2, their neuroticism scores were somewhat higher. However, once data was collapsed across groups, the same high extraversion scores, with no significant differences between winners' and losers' means, became apparent, but winners were found to score significantly lower on the neuroticism scale than losers. No differences in psychoticism were found between winners and losers.

Earlier mention has been made of a link between levels of chronic arousability and Eysenck's extraversion-introversion dimension (Welford, 1976). For example, introverted subjects, because of higher levels of chronic arousal than extraverts, had performed better under monotonous conditions. In this investigation, in Study 2, where novice players scored lower on extraversion (near significant) than skilled players, there were no initial group mean differences in the high levels of arousal, as measured by the SACL, prior to completion of the squash task. In Study 3, where winners and losers registered similar group mean scores on extraversion, once again there were no significant group mean differences between winners and losers on arousal scores, which again were high and measured using the SACL instrument. Evidence here suggested that, on average, subjects were highly aroused prior to squash performance or competitive squash play irrespective of their scores on the extraversion-introversion dimension.

Nideffer's interpersonal style scales (TAIS)

Nideffer interpersonal subscale results from Study 2 showed that skilled, when compared to novice players, exhibited higher levels of self-esteem (SES) and physical orientation (P/O), and lower levels of introversion (INT), obsession (OBS) and depression (DEP), showing greater tendency to express their feelings to others (PAE).

Available normative data on the TAIS interpersonal subscales is rather scarce, and few of the studies carried out on sports populations refer to the interpersonal subscales. The mean scores from Study 2 can be compared with mean scores from psychology students, business executives and police applicants (Nideffer, 1977), as shown in Appendix C, Table C.4.1.

No correlational relationships were revealed between the Nideffer interpersonal scales and the Eysenck personality scales, although the descriptions and the item content of their respective extroversion and extraversion scales, for example, appear, at least at face value, to be similar. It might have been expected that some relationship between the two extraversion scales would have been found. In Study 2, an almost significant difference in group means was obtained between skilled and novice squash players on the Eysenck extraversion measure, but differences in group means on Nideffer extroversion or introversion subscales were not even near significant.

In general, the results obtained from Nideffer's TAIS interpersonal subscales were rather contradictory and confusing. They provided little useful evidence of personality differences between sports performers of different abilities and failed to identify differences between winners and losers. Taken together with the findings from the attentional subscales of the TAIS, there must be some doubt as to the overall effectiveness of this instrument. By way of contrast, the results obtained from the Eysenck personality measures in this investigation allow a greater level of confidence. The findings

support the tentative conclusions on personality in sport made by Eysenck, Nias and Cox (1982). Personality scores from the skilled players in Study 2 and the winners and losers in Study 3 confirmed their claim that sportsmen tend to be more extraverted than average. In addition, claims that outstanding sports performers score low on neuroticism are confirmed by the evidence from the skilled players in Study 2 and the winners from Study 3.

In the interpretation of personality data, some caution is required with respect to the question of causality. However, based on the results obtained in Studies 2 and 3 and evidence from other sources, it is likely that the personality characteristics of sports performers play an important role in success in sport.

Telic dominance scale (TDS)

The TDS was intended to measure the individual's predisposition to spend time in the telic or paratelic states. No significant differences between the various squash groups were obtained in this investigation. Skilled, and novice players in Study 2 and club, county and England under-19 players and winners and losers in Study 3 showed no significant group differences in TDS subscale or total telic dominance scores.

Previous work on sports populations, although sparse, had shown that participants in different sports varied in their telic dominance characteristics. Kerr (1987c), for example, found that "professional" sports performers were significantly more telic dominant than "serious amateur" and "recreational" sports performers. Aspects of telic dominance were shown to play an important role in subjects' preference for and participation in different sports (Svebak & Kerr, in press). Also, participants within one particular sport were shown to exhibit similar telic dominance characteristics. Research by Kerr (in press-c) had, in a cross-cultural study, found no significant differences in the

telic dominance characteristics of rugby players from four different countries.

Interpretation of the absolute scores on the TDS measure obtained here in relation to other TDS findings is somewhat problematic because these scores may be context specific. To date, not enough normative data has been collected on sports populations. Nevertheless, interest is continuing and data on these populations is being collected and will be available in the future. However, in the present circumstances, reversal theory would not necessarily predict any differences, and to this extent the findings were not totally unexpected. Results from the state version of the TDS, the Telic State Measure, proved more interesting and are discussed in a later section.

SELF-REPORTED MOOD

Stress-Arousal Checklist

The versatility and reliability of the SACL as a measure of self-reported mood have been discussed in Chapters 1 and 2. This thesis presents the first use of the SACL in the sports context. It was included to provide a picture of possible mood changes occurring during squash performance and competitive play.

Arousal

Regardless of ability level, players' arousal levels were high and were maintained at a high level throughout the test period in Study 2. In Study 3, in spite of there being no significant differences in group means in mood measure scores, winners' arousal scores were significantly higher overall and the pattern of their arousal scores remained relatively stable across the four games of the tournament. The arousal scores of the losers, however, did change and significant differences between group means were especially obvious at games 3

and 4. These findings, which have identified an association between high levels of arousal and success in squash, are contrary to all the theoretical predictions of optimal arousal theory and much of contemporary thinking in sports psychology (see Chapter 1).

Stress

In Study 2, important differences between the means of skilled, average and novice players were identified on self-reported stress levels. Average and novice players reported significantly higher levels of stress than skilled players. However, there were no increases in self-reported stress levels across the test session for any of the ability groups. In Study 3, winners' stress scores were held at a constant and moderate level throughout the tournament. Losers' stress scores were high initially but declined after game 2. Also, winners' stress scores significantly decreased across the individual games, while those of the losers' did not.

Telic State Measure

The TSM has previously been used in combination with psychophysiological measures or structured interviews conducted blind to the TSM results (e.g. Svebak, 1984; Svebak & Murgatroyd, 1985). This was the first comprehensive use of the TSM in sports task performance and competitive play situations.

Differences between skilled, average and novice groups in Study 2 were non-significant on all five items of the TSM. Pre to post task significant increases in planning orientation and felt arousal, with near significant increases on seriousmindedness, were obtained. Arousal discrepancy (preferred arousal minus felt arousal) decreased significantly, but the discrepancy was least for the skilled group, pre to post task. In addition, a significant interaction between group on the one hand and pre and post task arousal discrepancy was obtained.

Winners and losers in Study 3 showed non-significant group mean differences on the serious, planning and felt arousal items of the TSM. One exception occurred on the seriousminded item post game 2; losers' scores here were significantly higher than those of the winners. Although there were no group differences in preferred arousal, a significant effect of games was obtained. A significant decrease effect in level of preferred arousal pre to post game was also found. Winners' arousal discrepancy scores did not change significantly, but those of the losers did. A trend, approaching significance, was found in the interaction of group x games.

There are a number of interesting questions which arise in relation to understanding the discrepancy effect found for losers in Study 3. Did the arousal discrepancy come about from, for example, increasing levels of preferred arousal or decreasing felt arousal? (Based on arguments presented in the discussion section of Chapter 5, it appears that the discrepancy was brought about by a change in losers' levels of preferred arousal). Crucial to finding the answers to questions such as these is a correct assessment of the state of mind the losing players were in at the time. If, for instance, they were in the paratelic state, then the implication might be that the losers are increasingly looking for excitement or becoming increasingly bored. On the other hand, if they were in the telic state, then the implication is that they were increasingly willing to tolerate anxiety but becoming increasingly uninvolved emotionally. Conceivably any group of players (e.g. the losers in Study 3), at any one time, could (and in this case did) contain some players in the telic and some players in the paratelic state, so that, depending on the individual players concerned, either of these explanations could be appropriate. In this investigation, the problems which arise in attempting to interpret the losers' arousal discrepancy scores are related to the very nature and underlying philosophy of reversal theory.

The theory is concerned with the structure of human action in terms of the ways in which individuals experience the motives they have for the actions they undertake. As such, the theory is phenomenological

and subjective experience central to its structural phenomenological approach. Consequently, it may be seen as paradoxical that studies with group-based designs are used to test the theory. This problem is made more difficult when compound measures such as the arousal discrepancy score from the TSM are examined. Here, two ideographic measures (i.e. preferred arousal and felt arousal) which vary independently with each subject are added together in a group situation. In other words, individual patterns of felt and preferred arousal can become indistinct in group-based designs. In Study 2, for example, it was stated after examination of individuals' data that many of the telic dominant subjects were in the telic state, pre and post task performance. As a result, it was thought that these players tolerated high levels of arousal which are usually not preferred in the telic state. In addition, at least seven subjects from different ability groups were thought to have reversed at least once (three from telic to paratelic and four from paratelic to telic) between the first and second completion of the TSM. All this is, of course, not obvious from the group analysis.

Associated with the TSM are a number of other problems which further complicate the business of unravelling the arousal discrepancy data. Firstly, as previously pointed out, the TSM did not show significant changes in arousal between winners and losers over the four games in Study 3, but the SACL arousal subscale did. This may have been due to difficulties in the clarity of instructions given to subjects with regard to the meanings of the words used on the TSM, although extended instructions were given. The use of checklists (SACL) does not require extended instructions (see Svebak & Murgatroyd, 1985). It seems more likely that the problem lies with the TSM item scales, in that a 6-point scale may be too small or too insensitive to register subtle changes in arousal. The SACL arousal subscale, although constructed differently in the form of a mood adjective checklist, has a 12-point arousal "scale", which in this circumstance did allow changes in arousal to be identified. Casual observation of the TSM felt arousal data from winners and losers in Study 3, in which the scale was extended, produced a graphical pattern the similar to that produced

from the SACL data. This problem of sensitivity may not have been obvious on previous occasions, because often the use of the TSM involved extreme telic or paratelic subjects who were perhaps more likely to score at either end of the item scales. Also, in previous studies the TSM was often used in combination with some other method of measurement.

As a criterium in previous studies for deciding whether an individual is in the telic or paratelic state, the subject's score on the seriousminded item from the TSM was thought to be the best indicator. However, this item may be incorrectly labelled for sports performers. Apter (personal communication, February 1988) has suggested that since sports performers repeatedly report, often after the most challenging or demanding competition (see also Kerr, 1985a), positive or pleasant feelings of enjoyment or exhilaration, there may be a difficulty with the language used. Sports competitors may well be in the paratelic state but, because the word "serious" is used, a wrong assessment may be made. There may be a need to change the adjectives at each end of the scale; perhaps instead of "serious", "determined" would be a more appropriate substitute. Alternatively, it might be that good performance is associated with the telic state, but exceptional performance may be associated with paratelic functioning. Or the situation might be, as Kerr (1987b) suggested, that dominance and metamotivational state conditions should match up for good performance to be achieved.

Clearly there is still a good deal of research to be carried out on psychological state and performance before these and similar questions can be resolved. In this investigation, at least, the results suggest that further refinement of the TSM may be required in order to maximise its effectiveness as a measuring instrument. Considerable effort should be invested in exploring the effectiveness of the TSM, because it, or a similar instrument, will play a central role in the solution of these intriguing questions.

Players' experience during performance and play

The data from the SACL and TSM in Study 2 were considered together and a definite pattern became apparent. This pattern reflected differences in the way the various squash ability groups experienced the experimental task demands. High levels of arousal (SACL) experienced by the skilled players prior to and during the task were reported as non-stressful (SACL) and likely therefore to have been associated with positive hedonic tone and experienced as pleasant. The average and novice players, by way of contrast, reported high levels of stress (SACL), accompanied by high arousal (SACL), before and after the test session. As evident in their self-reported mood scores, the average and novice players' experience during the squash task would likely have been relatively unpleasant. For the novice and average subjects in Study 2, the significantly greater discrepancy between preferred and actual levels of felt arousal (TSM) suggested that they were less successful than the skilled players at achieving their preferred levels of arousal. The higher levels of stress (SACL) reported by these subjects are in agreement with reversal theory explanations that discrepancies in preferred and actual felt arousal levels are likely to be experienced as stressful. In addition, and showing overlap between the two theoretical approaches, the stress scores also confirm notions of arousal discrepancy, compensatory behaviour and negative emotional experience put forward by Cox, Thirlaway and Cox (1982) (see Chapter 1). Also, research work by Dowd and Innes (1981), which reported that skillful players scored lower on anxiety than less skillful players, and the low level of pre-game anxiety symptoms reported by skilled players in Study 1 (see Chapter 3) provide additional support for these findings.

In Study 3, game 2 was thought to be crucial for losers in terms of their chance of success in the tournament, and this was reflected in their self-reported mood data. The arousal (SACL) and stress (SACL) levels of losers at games 3 and 4 became significantly lower than those of the winners. This pattern was confirmed to some degree by arousal discrepancy (TSM) scores. Losers' discrepancy scores increased significantly as the tournament progressed, and especially after game 2 as the losers continued to be unsuccessful.

Although there were no significant differences between winners' and losers' felt arousal scores (TSM), the SACL data showed that winners' arousal scores remained relatively stable throughout the tournament, while losers' arousal scores (SACL) changed significantly at games 3 and 4. From the TSM data, the preferred arousal (TSM) response pattern for winners and losers, taken over the four games in Study 3, was similar. At the beginning of the tournament it was high, falling away during games 2 and 3 and then increasing again for the last game. Further indication that important psychological changes took place at game 2 is provided by the significantly lower score of the losers on the seriousminded subscale (TSM) post game 2.

OVERALL SUMMARY OF FINDINGS

Overall, successful players (that is skilled players in Study 2 and winners from Study 3) were highly extravert and significantly less neurotic than other groups of players. Telic dominance was not a discriminating characteristic in this investigation, but successful players' attentional styles were significantly different, as defined by Nideffer's BIT and INFP subscales, to those styles or strategies employed by less capable players. Successful players generally employed psychological preparation strategies prior to and during play to a greater extent than other players. When doing so, they were more concerned with cognitive strategies, in the form of focussing and planning, than arousal modulation strategies.

In addition, successful players were either less affected by, or perhaps more successful at minimising, ^{NEGATIVE} emotional responses to playing demands than less successful players. In general, arousal levels were high and successful players achieved and maintained higher arousal levels than unsuccessful players. Thus, high arousal was an intrinsic element of their performance and play, but one which was experienced as non-stressful. A tentative model of psychological elements in successful squash is shown in Fig. 16.

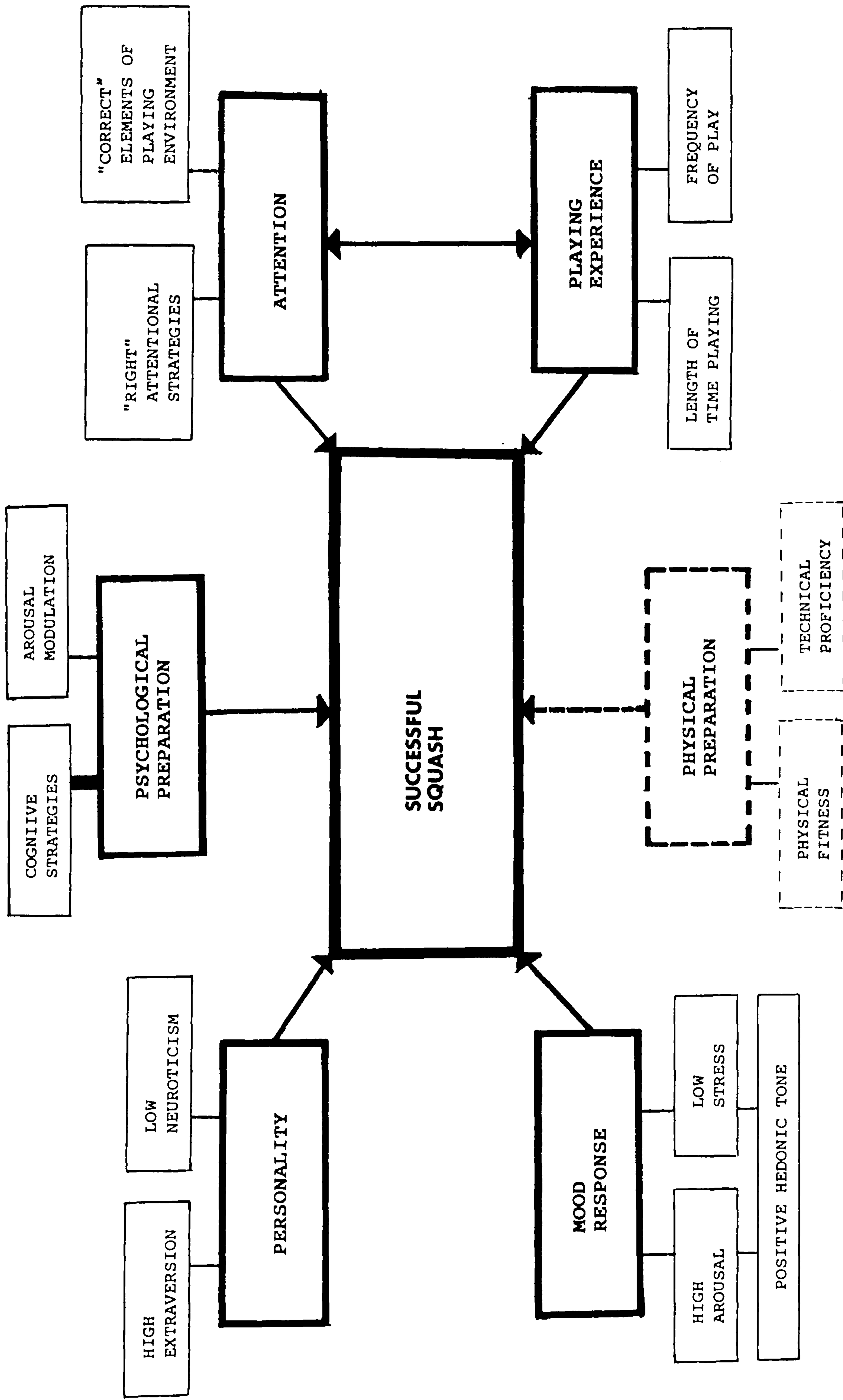


FIG. 16. MODEL OF PSYCHOLOGICAL ELEMENTS IN SUCCESSFUL SQUASH.

In Chapter 4, it was argued that differences of this nature in reported mood would be likely to affect performance, that is in addition to initial variations in ability. The skilled players' mean performance scores were rather higher than might be expected if the differences were due solely to ability differences. However, any decision as to whether skill level and membership in various ability groups are the result of, or determine, these individual differences goes beyond the scope of this investigation. In similar vein, the difficulties of the cause and effect debate can be seen in attempting to interpret the results from Study 3. Here again, groups were matched for ability and the relationship between playing performance and players' psychological reactions appeared to be inextricably linked.

ADDITIONAL CONSIDERATIONS FROM REVERSAL THEORY

This thesis has usefully extended knowledge of the psychological effects that are involved in competitive sport, but it would be interesting to speculate on the further possibilities offered by Apter's (1982) theory. This extended interpretation is not the direct concern of this thesis, but reversal theory's comprehensive view of human behaviour provides some additional relevant explanations of the competitive sports process. By necessity, this involves expanding the concepts of tension and effort-stress first mentioned in Chapter 1 and introducing the concept of "self-tone" (Apter & Smith, 1985), a kind of subset of hedonic tone. Firstly, a closer examination of the likely role in competitive squash of one other pair of metamotivational states, the mastery-sympathy pair, and its relationship with "felt transactional outcome" is undertaken.

In reversal theory, as well as the telic and paratelic pair, three other pairs of metamotivational states have been postulated: the mastery-sympathy, allocentric-autocentric and negativistic-conformist pairs (see Appendix D for a glossary of reversal theory terms). The theory also proposes that these metamotivational states can be operative, in various combinations and intensities, at the same time.

The first of these additional pairs of metamotivational states is thought to be especially relevant to the discussion of psychological effects in the squash tournament. Unfortunately, speculation about the role of the mastery-sympathy pair must remain theoretical. Although the early design of possible measuring instruments has been attempted, fully tested, valid and reliable scales are not, as yet, available. It is regrettable that such measures were not available for inclusion in Studies 2 and 3.

Apter and Smith (1985) have pointed out that the mastery-sympathy and allocentric-autocentric pairs are concerned with felt transactional outcome, defined as "the perceived outcome of an interaction in terms of the degree of gain or loss which it is felt to represent". This results in the experience of pleasantness or unpleasantness, termed in the theory "self-tone", and thought to be of a different quality from the hedonic tone associated with the telic and paratelic states. Self-tone is, however, still considered part of overall hedonic tone. Consequently, pleasant self-tone, feelings of happiness and contentment, may accompany success (in terms of autocentric mastery) during competitive play. Equally, unpleasant self-tone may accompany perception of failure (see below).

It was proposed in Chapter 5 that the discrepancy in preferred and felt arousal would lead to players (losers) experiencing effort-stress as they attempted to reduce tension-stress, brought about by this discrepancy. As the discrepancy in preferred and felt arousal increased, some of the losers' effort might have been diverted from trying to win the game into attempting to achieve the preferred level of arousal. They might, for example, have tried to play unnecessarily risky shots or deliberately got angry in an attempt to increase their arousal. This in turn would mean that they would be less likely to win the game, thus setting up a kind of vicious circle.

However, it could also be argued, in reversal theory terms, that some of the effort-stress in playing squash relates to the mastery-sympathy states rather than to the arousal discrepancy associated with

the telic and paratelic dimensions. Effort-stress is associated with effort expended in the reduction of tension-stress which accompanies tension. From the reversal theory definition of tension it should be clear that tension can arise from sources other than a discrepancy between felt and preferred arousal. Tension is defined as "a feeling that accompanies, and is proportional to, any discrepancy between a preferred and actual level of some variable". According to reversal theory, players involved in competitive squash are likely to be in the mastery state for most of the time while playing, therefore at least some of the players' efforts might be directed towards reducing the discrepancy between preferred and actual felt transactional outcome.

This type of discussion is, of course, useful in that it provides new possibilities for an understanding of the psychological aspects of competitive sport. Some of the arguments and suggestions about the role of the mastery-sympathy pair, for example, are only speculative at this point due to a lack of empirical evidence. However, it must be remembered that reversal theory is relatively new and it is only after some 10 years' work that the predictions of the theory with respect to the telic-paratelic pair have been adequately confirmed. Once measures are developed, the opportunity will be available to test some of the other proposals from reversal theory in the context of competitive sport.

BEYOND THE INVERTED-U RELATIONSHIP?

Much of the discussion in Chapter 1 centred around the limitations associated with the inverted-U relationship as a theoretical base for the understanding of the relationship between arousal and performance. Cox and Mackay's (Cox, 1978; Mackay et al., 1978) model of stress and arousal, along with reversal theory (Apter, 1982), were proposed as more versatile alternative theoretical approaches. The results obtained from the SACL and TSM instruments in this investigation obviously run counter to the arguments of optimal arousal theory, underlining the

limitations of its use to explain complex psychological functioning in sport. These results also extend present knowledge of competitive sport, providing a more complete picture of the psychological aspects involved. The resilience of the orthogonal model of stress and arousal (Cox, 1978; Mackay et al., 1978) and the sensitivity of the SACL instrument have again been demonstrated in a new context.

Reversal theory, in spite of some possible shortcomings with the TSM, provides another viable alternative to optimal arousal theory. The SACL results, as well as providing support for Cox and Mackay's approach, equally provide evidence for the arguments of reversal theory. Indeed, the results of this investigation have illustrated a number of areas of overlap between the two theoretical approaches, even though they were developed independently and originated from rather different theoretical foundations.

In addition, the results obtained from all three studies, which indicated the important role of high levels of arousal, have important implications for cognitive intervention possibilities with sports performers. In Chapter 1, a model (Kerr, 1987b) was proposed which argued that there were four possible options for affecting arousal levels in sport. Based on the findings of this investigation, arousal reduction techniques as part of psychological preparation, or for intervention during competitive performance or play, would appear to have been inappropriate for many of the squash players in this study.

CONCLUDING COMMENTS

One of the most pleasing aspects of undertaking this research investigation was the enthusiastic support received from squash players and others involved in the sport. Players were especially willing to act as subjects, even though this involved a considerable time commitment on some occasions. However, while players are often willing to take part in research, they tend to draw a line when it comes to real top-level performance or competition. They are concerned that any

deviation from their normal routine or preparation may interfere with their subsequent performance. As a result, the squash simulation study provided an ecologically valid opportunity for study without the outcome being crucial to the players' future. It proved to be a particularly effective vehicle for measuring players' psychological responses during competition. In addition, the simulation could be easily replicated, for squash or other racquet games and the principles involved could be applied to other sports.

Although the present research investigation proved useful in that it provided some accurate and relevant information about the competitive sports process, it has clearly generated a whole series of new questions. Some possibilities which may become the focus of further research studies include an examination of an individual's psychological reactions over a full-length squash match or series of squash matches, allowing data to be compared over a longer period. Such an approach might attempt to incorporate interview material in the design and, throughout the play, register ongoing personal reports from players along with state measures. Additionally, attempts could be made to manipulate stress and/or arousal levels before play, allowing the possible effects on performance to be monitored. Finally, the questions raised during the discussion of reversal theory concepts in this chapter warrant future attention.

* * * * *

The results of the studies included in this thesis have given rise to a number of implications for squash coaching and player development; these are included as an addendum.

ADDENDUM: IMPLICATIONS FOR SQUASH COACHING AND PLAYER DEVELOPMENT**SUCCESSFUL PLAYERS:**

- (1) have been playing longer and play more often than unsuccessful players.
- (2) are aware of the importance of psychological preparation both prior to and during games.
- (3) concentrate on cognitive aspects of psychological preparation, especially planning.
- (4) have attained a level of expertise which allows them to successfully implement tactical strategies (Hughes, 1986).
- (5) generally report low levels of anxiety pre game.
- (6) generally do not attempt to reduce levels of arousal.
- (7) could be more aware of the need to change their psychological strategy when "things are going wrong".
- (8) have learned through practice and experience which are the important or crucial correct features of play.
- (9) are aware of and able to allocate more attention to the changing game situation and are more flexible in their responses to the demands of play.
- (10) when necessary, are better at concentrating and narrowing attention on specific features of the game.
- (11) exhibit personality characteristics which reflect high extraversion and low neuroticism.
- (12) experience high levels of arousal in a comfortable, non-disruptive, positive way prior to and during play (i.e. accompanying low levels of stress).
- (13) are better at matching preferred levels of arousal with the level of arousal they actually experience.

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APPENDICES

A: Pilot Study	A.1
B: Measures	B.1
C: Tables	C.1
D: Glossary of Reversal Theory Terms	D.1

APPENDIX A

PILOT STUDY

Introduction	A.1
Method	A.2
Results and commentary	A.2

APPENDIX A: PILOT STUDY

INTRODUCTION

As previously mentioned (Chapters 2 and 4), prior to the inclusion of a physiological indicant of arousal (heart rate) into the research design of Study 2, a small scale pilot experiment was undertaken. This was necessary (1) to test the general experimental design of the main study, and (2) to specifically test the effectiveness of the Medilog recorder in recording changes in heart rate during the active performance of squash skills required in Study 2.

METHOD**Subjects**

The subjects who volunteered to take part were five male physical education students aged between 20 and 28 years. As squash players they were considered to be particularly skillful, being the most proficient players from a total of 124 students.

Measures

Those measures that were to be used in the main study were also included in the pilot experiment. These were the Eysenck Personality Inventory (EPI; Eysenck, 1964), the Telic Dominance Scale (TDS; Murgatroyd et al., 1978), the Test of Attentional and Interpersonal Style (TAIS; Nideffer, 1976), the Stress-Arousal Checklist (SACL; Mackay et al., 1978; Cox & Mackay, 1985) and the Telic State Measure (TSM; Svebak & Murgatroyd, 1985).

Procedure

Subjects were required to:

- (1) Complete the:
Eysenck Personality Inventory (EPI; Eysenck, 1964);
Telic Dominance Scale (TDS; Murgatroyd et al., 1978);
Test of Attentional and Interpersonal Style (TAIS; Nideffer, 1976).
- (2) Be fitted with the Medilog heart rate monitor.
- (3) Complete the:
Stress/Arousal Checklist (SACL; Mackay et al., 1978; Cox and Mackay 1985);
Telic State Measure (TSM; Svebak & Murgatroyd, 1985).
- (4) Warm up for a period of 5 minutes by hitting forehand shots to the front wall of the squash court from a position at the rear of the court.
- (5) Again complete the SACL and TSM.
- (6) Fulfill the requirements of the 1st squash task, i.e. strike a marked target area on the front wall of the squash court with 30 continuous shots (see Figs. A.1.a and b). Scores were marked by an independent observer.
- (7) Complete SACL and TSM for the third time.
- (8) Fulfill the requirements of the 2nd squash task, i.e. strike a marked target area on the front wall of the squash court and a second marked target area at the rear of the squash court with 30 continuous shots (see Figs. A.1.a and b). Scores were marked by an independent observer.
- (9) Complete the SACL and TSM a fourth time.

N.B. The whole experimental procedure was filmed throughout on videotape to allow a retrospective examination of the experimental tasks to be undertaken.

RESULTS AND COMMENTARY

Heart rate recordings obtained during the pilot study proved unsuitable for analysis. This was thought to be due to a combination of

factors affecting electrode contact. Additional problems with the temperature of the squash ball and the position of the target in task 2 invalidated performance scores. As a result, questionnaire and checklist data collected were not analysed. A number of modifications, summarised below, were made to the experimental procedure in the main study (i.e. Study 2, Chapter 4).

(1) The use of the Medilog recorder

Prior to carrying out the experiment, some exploratory testing was carried out to find the most comfortable and least restrictive position for the backpack and electrode wires. The most appropriate position for the electrode wires was on the side of the body opposite to the racquet arm of the subject. The backpack containing the recording device was positioned in the small of the back and the electrode leads were taped to the subject's body using surgical tape (see Fig. A.2). In spite of the experimenter's careful attention to detail (for example the placement and fixing of electrodes), heart rate recordings obtained during the pilot study proved unsuitable for analysis. The vigorous nature of the movements involved, coupled with the effect of perspiration during and after warm-up were thought to have caused problems affecting electrode contact. In spite of attempts to remedy this situation, no solution to these problems could be found. In view of the problems described above, it was reluctantly decided to abandon attempts to obtain physiological data in this experiment.

(2) The completion of the Stress Arousal Checklist (SACL) and Telic State Measure (TSM) between the squash tasks

The administration of psychological inventories between the squash tasks also proved to be problematic. Even though the time taken to complete these was relatively short, difficulties were encountered in keeping the squash ball warm. The temperature of a squash ball bears a direct relationship to its elasticity (Chapman & Zuyderhoff, 1986). As a result, subjects experienced difficulty on attempting to complete the

second performance task because the ball had cooled down and was not bouncing as high as it had done during the first performance task where the ball had been properly warmed up. In the light of the subjects' experienced difficulties, it was decided that they should be allowed to perform the two tasks uninterrupted. They would not be required to complete the state measures between tasks.

(3) The placement of the front wall target

It became obvious during observation in the pilot experiment (subsequently confirmed by the video tape recording) that the subjects attempting to perform the more difficult squash task were not being successful. Feedback obtained from the subjects following the experiment revealed that the front wall target was too low, making it very difficult to reach the rear target. Further experimentation on a trial-and-error basis showed that, by elevating the target so that the bottom line of the target coincided with the service line on the front wall, subjects were able to achieve scores on both targets (see Fig. A.1.a).

The experimental procedure for Study 2 was modified to eliminate the problems outlined above. More complete details are provided in Method section of Chapter 4.

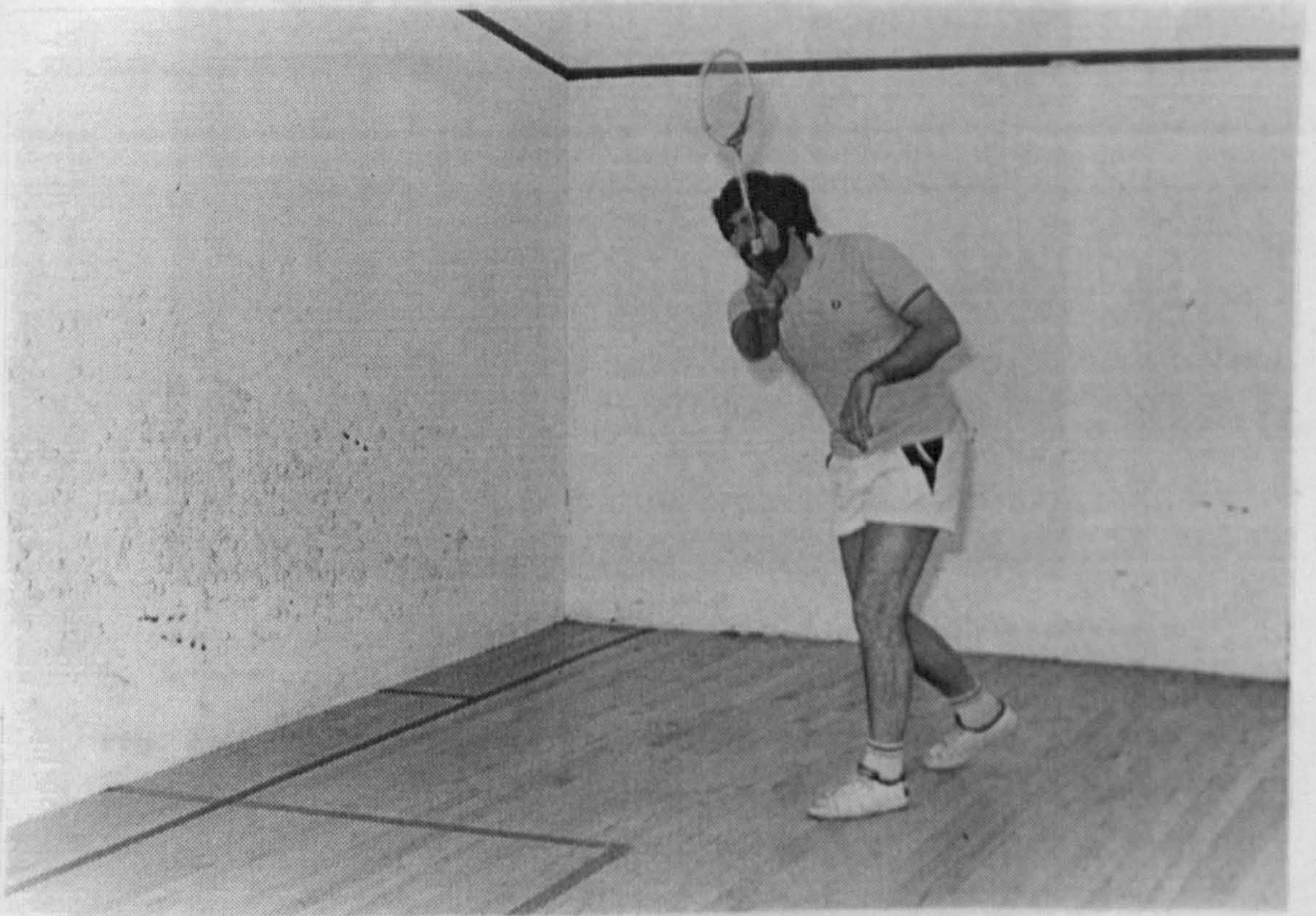
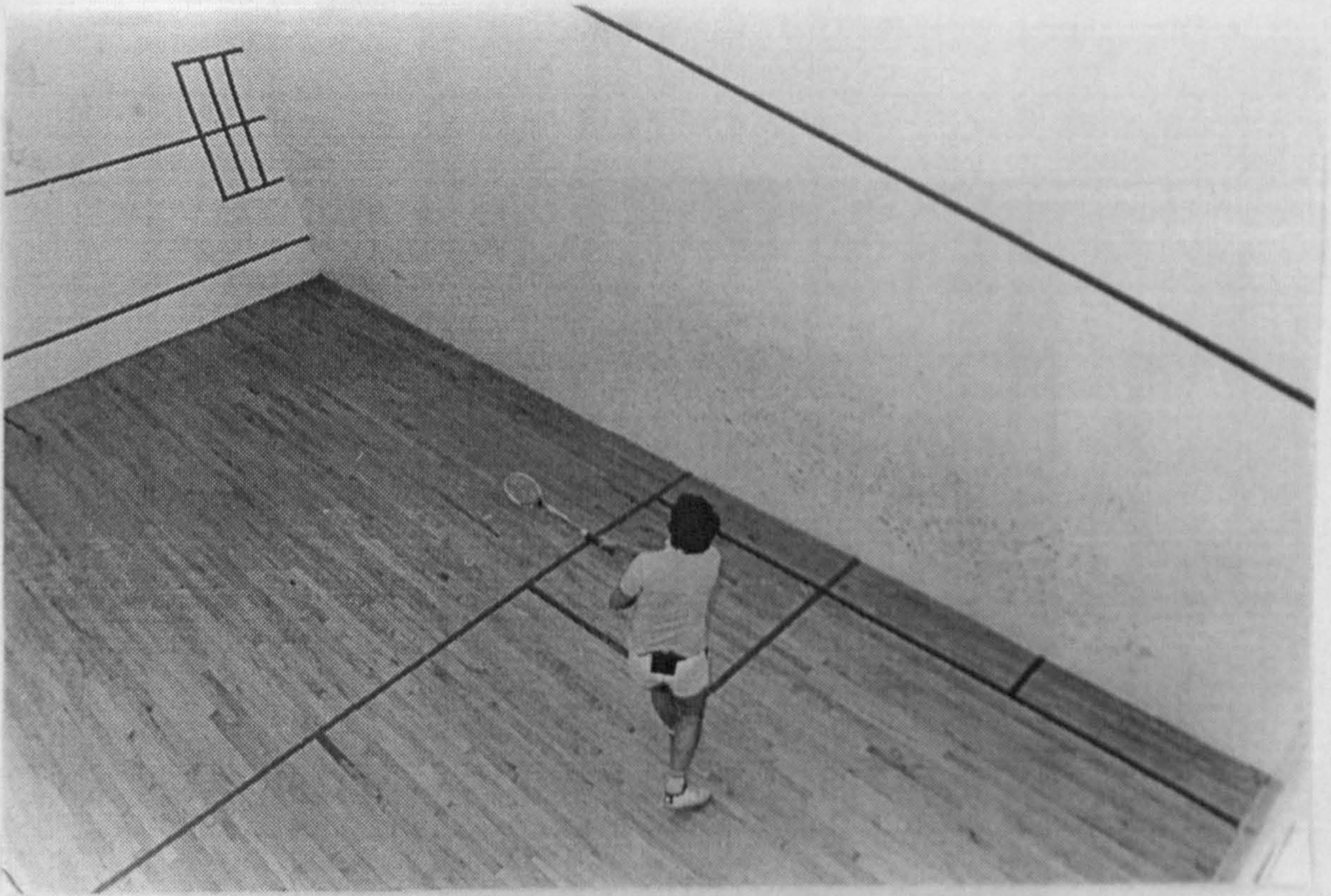


Fig. A.1.a & b. A subject performing the squash task during the pilot study.

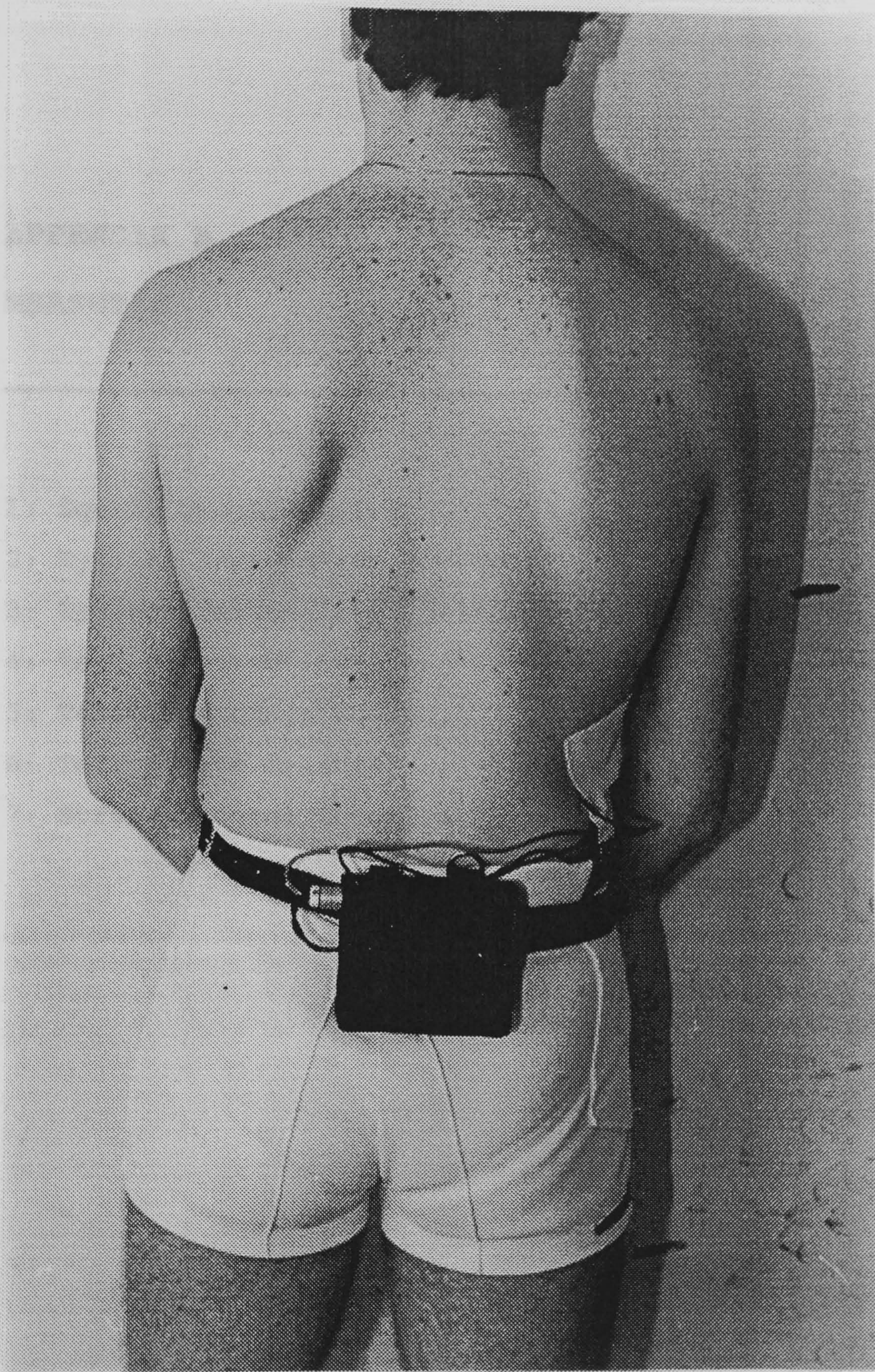


Fig. A.2. Photograph of a left-handed subject wearing the medilog recorder.

APPENDIX B

MEASURES

1: Squash questionnaire	B.1
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APPENDIX B.1: SQUASH QUESTIONNAIRE

NAME: _____

PLEASE COMPLETE THE FOLLOWING QUESTIONS ON SQUASH, BEING AS FRANK AND HONEST AS YOU CAN WITH YOUR ANSWERS.

1. Age: _____ (years)
2. How long have you been playing squash? _____ years
3. I play squash:
 - once a month
 - once a week
 - twice a week
 - more than twice a week

(Please tick the appropriate answer)
4. Please tick the appropriate answer:
 - a. I consider myself a good player. I play regularly in a team and take my squash very seriously. I can play all the shots and particularly enjoy deceiving my opponent.
 - b. I consider myself an average player. I like playing people of my own standard. I can play most of the shots. Squash is an enjoyable way of keeping in shape.
 - c. I consider myself a beginner at squash. I do not play regularly and some of the shots I find difficult to play. Since starting the game I feel I have improved my standard of play.
5. Do you experience any of the following sensations just before you play squash? (Please tick as appropriate).
 - a feeling of dizziness
 - a feeling of queasiness in the stomach
 - sweaty hands
 - a quickening of the heartbeat
 - actually throwing up
 - a relaxed, calm feeling
 - the feeling that you need to urinate
 - a lack of concentration
6. Before playing a game of squash, do you attempt to prepare yourself mentally?

YES

NO

(Please tick the appropriate answer)

IF YOUR ANSWER TO QUESTION 6 WAS "YES", THEN CONTINUE TO ANSWER QUESTIONS ON THIS PAGE. IF IT WAS "NO", THEN YOU HAVE FINISHED.

7. Describe briefly how you prepare yourself mentally for the game:

8. Does your psychological preparation change with the importance of the game and the ability of your opponent?

YES

NO

(Please tick the appropriate answer)

If so, describe the differences between:

a. an important league game or a friendly match

b. a player of higher ability or a player of lower ability

9. Do you consciously try to "psych" yourself up and psychologically prepare prior to a game?

YES

NO

(Please tick the appropriate answer)

10. Do you always play better as a result?

YES

NO

(Please tick the appropriate answer)

If your answer is "no", then briefly describe the circumstances:

11. Do you continue this "psyching-up" process during the game by, for example, talking to yourself?

YES

NO

(Please tick the appropriate answer)

Write down some examples of the things you might say to yourself:

12. Do you think playing ability is related to how much you are "psyched up"?

YES

NO

(Please tick the appropriate answer)

13. Have you experienced a situation where you were "psyched up":

a. too much

b. too little

and your play was affected as a result? (Please tick the appropriate answer).

Describe what happened:

IF YOU HAVE ANSWERED THE QUESTIONS ON PAGES 2 AND 3, YOU ARE FINISHED.

APPENDIX B.2: EYSENCK PERSONALITY INVENTORY (EPI; EYSENCK, 1964)

FORM A

	Yes	No
1. Do you often long for excitement?	0	0
2. Do you often need understanding friends to cheer you up?	0	0
3. Are you usually carefree?	0	0
4. Do you find it very hard to take no for an answer?	0	0
5. Do you stop and think things over before doing anything?	0	0
6. If you say you will do something do you always keep your promise, no matter how inconvenient it might be to do so?	0	0
7. Does your mood often go up and down?	0	0
8. Do you generally do and say things quickly without stopping to think?	0	0
9. Do you ever feel "just miserable" for no good reason?	0	0
10. Would you do almost anything for a dare?	0	0
11. Do you suddenly feel shy when you want to talk to an attractive stranger?	0	0
12. Once in a while do you lose your temper and get angry?	0	0
13. Do you often do things on the spur of the moment?	0	0
14. Do you often worry about things you should not have done or said?	0	0
15. Generally, do you prefer reading to meeting people?	0	0
16. Are your feelings rather easily hurt?	0	0
17. Do you like going out a lot?	0	0
18. Do you occasionally have thoughts and ideas that you would not like other people to know about?	0	0
19. Are you sometimes bubbling over with energy and sometimes very sluggish?	0	0

B.5

	Yes	No
20. Do you prefer to have few but special friends?	0	0
21. Do you daydream a lot?	0	0
22. When people shout at you, do you shout back?	0	0
23. Are you often troubled about feelings of guilt?	0	0
24. Are all your habits good and desirable ones?	0	0
25. Can you usually let yourself go and enjoy yourself a lot at a lively party?	0	0
26. Would you call yourself tense or "highly-strung"?	0	0
27. Do other people think of you as being very lively?	0	0
28. After you have done something important, do you often come away feeling you could have done better?	0	0
29. Are you mostly quiet when you are with other people?	0	0
30. Do you sometimes gossip?	0	0
31. Do ideas run through your head so that you cannot sleep?	0	0
32. If there is something you want to know about, would you rather look it up in a book than talk to someone about it?	0	0
33. Do you get palpitations or thumping in your heart?	0	0
34. Do you like the kind of work that you need to pay close attention to?	0	0
35. Do you get attacks of shaking or trembling?	0	0
36. Would you always declare everything at the customs, even if you knew that you could never be found out?	0	0
37. Do you hate being with a crowd who play jokes on one another?	0	0
38. Are you an irritable person?	0	0
39. Do you like doing things in which you have to act quickly?	0	0
40. Do you worry about awful things that might happen?	0	0

B.6

	Yes	No
41. Are you slow and unhurried in the way you move?	0	0
42. Have you ever been late for an appointment or work?	0	0
43. Do you have many nightmares?	0	0
44. Do you like talking to people so much that you never miss a chance of talking to a stranger?	0	0
45. Are you troubled by aches and pains?	0	0
46. Would you be very unhappy if you could not see lots of people most of the time?	0	0
47. Would you call yourself a nervous person?	0	0
48. Of all the people you know, are there some whom you definitely do not like?	0	0
49. Would you say that you were fairly self confident?	0	0
50. Are you easily hurt when people find fault with you or your work?	0	0
51. Do you find it hard to really enjoy yourself at a lively party?	0	0
52. Are you troubled with feelings of inferiority?	0	0
53. Can you easily get some life into a rather dull party?	0	0
54. Do you sometimes talk about things you know nothing about?	0	0
55. Do you worry about your health?	0	0
56. Do you like playing pranks on others?	0	0
57. Do you suffer from sleeplessness?	0	0

PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL THE QUESTIONS

APPENDIX B.3: EYSENCK PERSONALITY QUESTIONNAIRE (EPQ; EYSENCK & EYSENCK, 1975)

Occupation

Age Sex

INSTRUCTIONS. Please answer each question by putting a circle around the "YES" or the "NO" following the question. There are no right or wrong answers, and no trick questions. Work quickly and do not think too long about the exact meaning of the questions.

PLEASE REMEMBER TO ANSWER EACH QUESTION!

- 1. Do you have many different hobbies?..... YES NO
- 2. Do you stop to think things over before doing anything?.... YES NO
- 3. Does your mood often go up and down?..... YES NO
- 4. Have you ever taken the praise for something you knew someone else had really done?..... YES NO
- 5. Are you a talkative person?..... YES NO
- 6. Would being in debt worry you?..... YES NO
- 7. Do you ever feel "just miserable" for no reason?..... YES NO
- 8. Were you ever greedy by helping yourself to more than your share of anything?..... YES NO
- 9. Do you lock up your house carefully at night?..... YES NO
- 10. Are you rather lively?..... YES NO
- 11. Would it upset you a lot to see a child or an animal suffer?..... YES NO
- 12. Do you often worry about things you should not have done or said?..... YES NO
- 13. If you say you will do something, do you always keep your promise no matter how inconvenient it might be?..... YES NO
- 14. Can you usually let yourself go and enjoy yourself at a lively party?..... YES NO
- 15. Are you an irritable person?..... YES NO

- | | | |
|---|-----|----|
| 16. Have you ever blamed someone for doing something you knew was really your fault?..... | YES | NO |
| 17. Do you enjoy meeting new people?..... | YES | NO |
| 18. Do you believe insurance schemes are a good idea?..... | YES | NO |
| 19. Are your feelings easily hurt?..... | YES | NO |
| 20. Are all your habits good and desirable ones?..... | YES | NO |
| 21. Do you tend to keep in the background on social occasions? | YES | NO |
| 22. Would you take drugs which may have strange or dangerous effects?..... | YES | NO |
| 23. Do you often feel "fed-up"?..... | YES | NO |
| 24. Have you ever taken anything (even a pin or button) that belonged to someone else?..... | YES | NO |
| 25. Do you like going out a lot?..... | YES | NO |
| 26. Do you enjoy hurting people you love?..... | YES | NO |
| 27. Are you often troubled about feelings of guilt?..... | YES | NO |
| 28. Do you sometimes talk about things you know nothing about? | YES | NO |
| 29. Do you prefer reading to meeting people?..... | YES | NO |
| 30. Do you have enemies who want to harm you?..... | YES | NO |
| 31. Would you call yourself a nervous person?..... | YES | NO |
| 32. Do you have many friends?..... | YES | NO |
| 33. Do you enjoy practical jokes that can sometimes really hurt people?..... | YES | NO |
| 34. Are you a worrier?..... | YES | NO |
| 35. As a child did you do as you were told immediately and without grumbling?..... | YES | NO |
| 36. Would you call yourself happy-go-lucky?..... | YES | NO |
| 37. Do good manners and cleanliness matter much to you?..... | YES | NO |
| 38. Do you worry about awful things that might happen?..... | YES | NO |
| 39. Have you ever broken or lost something belonging to someone else?..... | YES | NO |
| 40. Do you usually take the initiative in making new friends?.. | YES | NO |
| 41. Would you call yourself tense or "highly-strung"?..... | YES | NO |
| 42. Are you mostly quiet when you are with people?..... | YES | NO |
| 43. Do you think marriage is old-fashioned and should be done away with?..... | YES | NO |
| 44. Do you sometimes boast a little?..... | YES | NO |

45. Can you easily get some life into a rather dull party?..... YES NO
46. Do people who drive carefully annoy you?..... YES NO
47. Do you worry about your health?..... YES NO
48. Have you ever said anything bad or nasty about anyone?..... YES NO
49. Do you like telling jokes and funny stories to your friends?..... YES NO
50. Do most things taste the same to you?..... YES NO
51. As a child were you ever cheeky to your parents?..... YES NO
52. Do you like mixing with people?..... YES NO
53. Does it worry you if you know there are mistakes in your work?..... YES NO
54. Do you suffer from sleeplessness?..... YES NO
55. Do you always wash before a meal?..... YES NO
56. Do you nearly always have a "ready answer" when people talk to you?..... YES NO
57. Do you like to arrive at appointments in plenty of time?.. YES NO
58. Have you often felt listless and tired for no reason?..... YES NO
59. Have you ever cheated at a game?..... YES NO
60. Do you like doing things in which you have to act quickly? YES NO
61. Is (or was) your mother a good woman?..... YES NO
62. Do you often feel life is very dull?..... YES NO
63. Have you ever taken advantage of someone?..... YES NO
64. Do you often take on more activities than you have time for?..... YES NO
65. Are there several people who keep trying to avoid you?..... YES NO
66. Do you worry a lot about your looks?..... YES NO
67. Do you think people spend too much time safeguarding their future with savings and insurances?..... YES NO
68. Have you ever wished that you were dead?..... YES NO
69. Would you dodge paying taxes if you were sure you could never be found out?..... YES NO
70. Can you get a party going?..... YES NO
71. Do you try not to be rude to people?..... YES NO
72. Do you worry too long after an embarrassing experience?.... YES NO
73. Have you ever insisted on having your own way?..... YES NO

74. When you catch a train do you often arrive at the last minute?..... YES NO
75. Do you suffer from "nerves"?..... YES NO
76. Do your friendships break up easily without it being your fault?..... YES NO
77. Do you often feel lonely?..... YES NO
78. Do you always practice what you preach?..... YES NO
79. Do you sometimes like teasing animals?..... YES NO
80. Are you easily hurt when people find fault with you or the work you do?..... YES NO
81. Have you ever been late for an appointment or work?..... YES NO
82. Do you like plenty of bustle and excitement around you?.... YES NO
83. Would you like other people to be afraid of you?..... YES NO
84. Are you sometimes bubbling over with energy and sometimes very sluggish?..... YES NO
85. Do you sometimes put off until tomorrow what you ought to do today?..... YES NO
86. Do other people think of you as being lively?..... YES NO
87. Do people tell you a lot of lies?..... YES NO
88. Are you touchy about some things?..... YES NO
89. Are you always willing to admit it when you have made a mistake?..... YES NO
90. Would you feel very sorry for an animal caught in a trap?.. YES NO

PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL THE QUESTIONS

**APPENDIX B.4: TEST OF ATTENTIONAL AND INTERPERSONAL STYLE (TAIS)
(NIDEFFER, 1976)**

TEST OF ATTENTIONAL AND INTERPERSONAL STYLE (TAIS)

Robert M. Nideffer, Ph.D.

INSTRUCTIONS

Read each item carefully and then answer according to the frequency with which it describes you or your behavior. For example, item 1 is "When people talk to me, I find myself distracted by the sights and sounds around me."

- A = NEVER**
- B = RARELY**
- C = SOMETIMES**
- D = FREQUENTLY**
- E = ALWAYS**

If your answer to the first item is SOMETIMES, you would mark with a No. 2 pencil under C for item number 1. The same key is used for every item, thus each time you mark an A you are indicating NEVER, etc.

1. Please be sure to mark your name in the spaces provided at the right of the answer sheet.
2. Fill in your date of birth in the spaces provided at the bottom of the answer sheet.
3. Indicate your sex in the space provided.
4. At the bottom of the answer sheet under Grade, please indicate the number of years of schooling you have completed.

	A B C D E

1. When people talk to me I find myself distracted by the sights and sounds around me.	0 0 0 0 0
2. When people talk to me I find myself distracted by my own thoughts and ideas.	0 0 0 0 0
3. All I need is a little information and I can come up with a large number of ideas.	0 0 0 0 0
4. My thoughts are limited to the objects and people in my immediate surroundings.	0 0 0 0 0
5. I need to have all the information before I say or do anything.	0 0 0 0 0
6. The work I do is focused and narrow, proceeding in a logical fashion.	0 0 0 0 0
7. I run back and forth from task to task.	0 0 0 0 0
8. I seem to work in "fits and starts" or "bits and pieces".	0 0 0 0 0
9. The work I do involves a wide variety of seemingly unrelated material and ideas.	0 0 0 0 0
10. My thoughts and associations come so rapidly I can't keep up with them.	0 0 0 0 0
11. The world seems to be a booming buzzing brilliant flash of colour and confusion.	0 0 0 0 0
12. When I make a mistake it is because I did not wait to get all of the information.	0 0 0 0 0
13. When I make a mistake it is because I waited too long and got too much information.	0 0 0 0 0
14. When I read it is easy to block out everything but the book.	0 0 0 0 0
15. I focus on one small part of what a person says and miss the total message.	0 0 0 0 0
16. In school I failed to wait for the teachers' instructions.	0 0 0 0 0
17. I have difficulty clearing my mind of a single thought or idea.	0 0 0 0 0
18. I think about one thing at a time.	0 0 0 0 0
19. I get caught up in my thoughts and become oblivious to what is going on around me.	0 0 0 0 0
20. I theorize and philosophize.	0 0 0 0 0
21. I enjoy quiet, thoughtful times.	0 0 0 0 0
22. I would rather be feeling and experiencing the world than my own thoughts.	0 0 0 0 0
23. My environment is exciting and keeps me involved.	0 0 0 0 0
24. My interests are broader than most people's.	0 0 0 0 0
25. My interests are narrower than most people's.	0 0 0 0 0
26. It is easy for me to direct my attention and focus narrowly on something.	0 0 0 0 0
27. It is easy for me to focus on a number of things at the same time.	0 0 0 0 0

	A B C D E

28. It is easy for me to keep thoughts from interfering with something I am watching or listening to.	0 0 0 0 0
29. It is easy for me to keep sights and sounds from interfering with my thoughts.	0 0 0 0 0
30. Happenings or objects grab my attention.	0 0 0 0 0
31. it is easy for me to keep my mind on a single thought or idea.	0 0 0 0 0
32. I am good at picking a voice or instrument out of a piece of music that I am listening to.	0 0 0 0 0
33. With so much going on around me, it's difficult for me to think about anything for any length of time.	0 0 0 0 0
34. I am good at quickly analyzing complex situations around me, such as how a play is developing in football or which of four or five kids started a fight.	0 0 0 0 0
35. At stores I am faced with so many choices I can't make up my mind.	0 0 0 0 0
36. I spend a great deal of my time thinking about all kinds of ideas I have.	0 0 0 0 0
37. I figure out how to respond to others by imagining myself in their situation.	0 0 0 0 0
38. In school I would become distracted and didn't stick to the subject.	0 0 0 0 0
39. When I get anxious or nervous my attention becomes narrow and I fail to see important things that are going on around me.	0 0 0 0 0
40. Even though I am not hungry, if something I like is placed in front of me, I'll eat it.	0 0 0 0 0
41. I am more of a doing kind of person than a thinking one.	0 0 0 0 0
42. In a room filled with children or out on a playing field, I know what everyone is doing.	0 0 0 0 0
43. It is easy for me to keep my mind on a single sight or sound.	0 0 0 0 0
44. I am good at rapidly scanning crowds and picking out a particular person or face.	0 0 0 0 0
45. I have difficulty shifting back and forth from one conversation to another.	0 0 0 0 0
46. I get confused trying to watch activities such as a football game or circus where a number of things are happening at the same time.	0 0 0 0 0
47. I have so many things on my mind that I become confused and forgetful.	0 0 0 0 0
48. On essay tests my answers are (were) too narrow and don't cover the topic.	0 0 0 0 0
49. It is easy for me to forget about problems by watching a good movie or by listening to music.	0 0 0 0 0

	A B C D E

50. I can't resist the temptation when it is right in front of me.	0 0 0 0 0
51. In games I make mistakes because I am watching what one person does and forget about the others.	0 0 0 0 0
52. I can plan several moves ahead in complicated games like bridge and chess.	0 0 0 0 0
53. In school I was not a "thinker".	0 0 0 0 0
54. In a room full of people I can keep track of several conversations at the same time.	0 0 0 0 0
55. I have difficulty telling how others feel by watching them and listening to them talk.	0 0 0 0 0
56. People have to repeat things to me because I become distracted by irrelevant sights or sounds around me.	0 0 0 0 0
57. I make mistakes because I try to do too many things at once.	0 0 0 0 0
58. I am good at analyzing situations and predicting in advance what others will do.	0 0 0 0 0
59. On essay tests my answers are (were) too broad, bringing in irrelevant information.	0 0 0 0 0
60. People fool me because I don't bother to analyze the things that they say; I take them at face value.	0 0 0 0 0
61. I would much rather be doing something than just sitting around thinking.	0 0 0 0 0
62. I make mistakes because my thoughts get stuck on one idea or feeling.	0 0 0 0 0
63. I am constantly analyzing people and situations.	0 0 0 0 0
64. I get confused at busy intersections.	0 0 0 0 0
65. I am good at glancing at a large area and quickly picking out several objects, such as in those hidden figure drawings in children's magazines.	0 0 0 0 0
66. I get anxious and block out everything on tests.	0 0 0 0 0
67. Even when I am involved in a game or sport, my mind is going a mile a minute.	0 0 0 0 0
68. I can figure out how to respond to others just by looking at them.	0 0 0 0 0
69. I have a tendency to get involved in a conversation and forget important things like a pot on the stove, or like leaving the motor running on the car.	0 0 0 0 0
70. It is easy for me to bring together ideas from a number of different areas.	0 0 0 0 0
71. Sometimes lights and sounds come at me so rapidly they make me lightheaded or dizzy.	0 0 0 0 0
72. People have to repeat things because I get distracted by my own irrelevant thoughts.	0 0 0 0 0

	A	B	C	D	E

73. People pull the wool over my eyes because I fail to see when they are obviously kidding by looking at the way they are smiling or listening to their joking tone.	0	0	0	0	0
74. I can spend a lot of time just looking at things with my mind almost a complete blank except for reflecting the things that I see.	0	0	0	0	0
75. I sometimes confuse others because I tell them too many things at once.	0	0	0	0	0
76. I engage in physical activity.	0	0	0	0	0
77. People describe me as serious.	0	0	0	0	0
78. I sit alone listening to music.	0	0	0	0	0
79. People take advantage of me.	0	0	0	0	0
80. I keep my thoughts to myself.	0	0	0	0	0
81. I keep my feelings to myself.	0	0	0	0	0
82. I am good at getting my own way.	0	0	0	0	0
83. I like to argue.	0	0	0	0	0
84. Others see me as a loner.	0	0	0	0	0
85. I talked a lot in class when I was in school.	0	0	0	0	0
86. I enjoy intellectual competition with others.	0	0	0	0	0
87. I enjoy individual athletic competition.	0	0	0	0	0
88. I compete(d) athletically.	0	0	0	0	0
89. I physically express my feelings of affection.	0	0	0	0	0
90. I compete with myself intellectually.	0	0	0	0	0
91. I compete with myself physically.	0	0	0	0	0
92. I enjoy activities with danger or an element of the unknown in them.	0	0	0	0	0
93. I express my opinions on issues.	0	0	0	0	0
94. I can keep a secret.	0	0	0	0	0
95. When I believe deeply in something I find I am a poor loser and unable to compromise.	0	0	0	0	0
96. I am socially self-confident when interacting with those who are like myself.	0	0	0	0	0
97. I am socially self-confident when interacting with authority figures.	0	0	0	0	0
98. I am socially self-confident when talking in front of large groups.	0	0	0	0	0
99. I am socially self-confident when talking with the opposite sex.	0	0	0	0	0
100. I express my anger.	0	0	0	0	0
101. I dated in high school.	0	0	0	0	0
102. People think I am a clown.	0	0	0	0	0
103. I get mad and express it.	0	0	0	0	0
104. I get down on myself.	0	0	0	0	0
105. I was one of the smartest kids in school.	0	0	0	0	0
106. I am a good person.	0	0	0	0	0
107. My feelings are intense.	0	0	0	0	0

A B C D E

108. I need to help others.	0	0	0	0	0
109. I need to be liked.	0	0	0	0	0
110. I enjoy planning for the future.	0	0	0	0	0
111. I wish I lived in a different time.	0	0	0	0	0
112. I feel guilty.	0	0	0	0	0
113. I feel ashamed.	0	0	0	0	0
114. I am seen as a cold person by others.	0	0	0	0	0
115. I am a good mixer.	0	0	0	0	0
116. I am socially outgoing.	0	0	0	0	0
117. I have difficulty waiting for good things to happen.	0	0	0	0	0
118. I peeked at Christmas time.	0	0	0	0	0
119. When I am angry I lose control and say things that sometimes hurt others.	0	0	0	0	0
120. I have been angry enough that I physically hurt someone.	0	0	0	0	0
121. At dances or parties I find a corner and avoid the limelight.	0	0	0	0	0
122. I acted in dramatic productions in high school and/or college.	0	0	0	0	0
123. In school the kids I hung around with were athletes.	0	0	0	0	0
124. In school the kids I hung around with were intellectuals.	0	0	0	0	0
125. In school the kids I hung around with were popular.	0	0	0	0	0
126. In school the kids I hung around with were outcasts or loners.	0	0	0	0	0
127. People trust me with their secrets.	0	0	0	0	0
128. I am in control of interpersonal situations.	0	0	0	0	0
129. I fought in school.	0	0	0	0	0
130. I have used illegal drugs.	0	0	0	0	0
131. In groups I am one of the leaders.	0	0	0	0	0
132. People admire me for my intellect.	0	0	0	0	0
133. People admire me for my physical ability.	0	0	0	0	0
134. People admire me for my concern for others.	0	0	0	0	0
135. People admire me for my social status.	0	0	0	0	0
136. I ran for class offices in school.	0	0	0	0	0
137. I feel as though I am a burden to others.	0	0	0	0	0
138. People see me as an angry person.	0	0	0	0	0
139. I see myself as an angry person.	0	0	0	0	0
140. I have a lot of energy for my age.	0	0	0	0	0
141. I am always on the go.	0	0	0	0	0
142. I cut school in high school.	0	0	0	0	0
143. I have engaged in activities that could get me in trouble with the police.	0	0	0	0	0
144. I guess you could call me a poor loser.	0	0	0	0	0

TEST OF ATTENTIONAL AND INTERPERSONAL STYLE**SCORING INSTRUCTIONS**

The TAIS is hand scored through the use of 18 scoring keys (1 for each scale). The scoring key is placed over the answer sheet so that the vertical lines pass through the middle box in each column. The procedure followed to obtain a scale score is then identical for each key. Items scored on a particular scale can be seen through the key. The subject's response to each item is scored from 0 to 4. If there is a single box around the item that is being scored, scoring proceeds from left to right (0, 1, 2, 3, 4). Thus, a response of "never" receives a 0 and a response of "always" receives a 4. If the item being scored has a double box around it, then scoring is reversed. In this instance, a response of "never" receives a 4 and a response of "always" is scored 0. The subject's score for a particular scale is simply the total of all responses.

The number of questions a subject leaves unanswered should be kept to an absolute minimum. To treat the one or two responses that subjects occasionally leave blank, assign a score of 2 to questions that are not answered. This practice avoids scoring in the direction of either of the two extremes.

A special procedure is followed with respect to scoring the self-esteem scale (SES). The score that is plotted is the total score of the SES scale responses minus the total score of the five items on the depression (DEP) scale.

APPENDIX B.5: TELIC DOMINANCE SCALE (TDS; MURGATROYD ET AL., 1978)

Confidential

THE TELIC DOMINANCE SCALE (TDS)

FORM A3

The Psychological Reversals Study Group, 1982

NAME SEX
OCCUPATION AGE

Instructions

Here are some alternative choices. If you have an open choice, which of the following alternatives would you usually prefer. Please complete all the items by putting a cross in the circle corresponding to your choice, making one choice for each numbered item. Only if you are not able to make a choice should you put a cross in the circle corresponding to 'Not sure'. Try to answer all of the items by putting a cross in one of the circles for each item, using the 'Not sure' choice as little as you can. Work quickly and do not spend too much time on any one item: it is your first reaction we want.

Now turn over the page and start. This is not a test of intelligence or ability and there are no right or wrong answers.

For further information about this scale, contact:

Dr. M.J. Apter
Psychology Department
University College, Cardiff
P.O. Box 78
Cardiff CF1 1XL
Wales, U.K.

Do not write in this space

S = — P = — A = —
 --- --- ---

Total: —

- | | |
|--|---|
| <p>1. Compile a short dictionary for financial reward.....0</p> <p>Write a short story for fun.....0</p> <p>Not sure.....0</p> <p>2. Going to evening class to improve your qualifications.....0</p> <p>Going to evening class for fun....0</p> <p>Not sure.....0</p> <p>3. Leisure activities which are just exciting.....0</p> <p>Leisure activities which have a purpose.....0</p> <p>Not sure.....0</p> <p>4. Improving a sporting skill by playing a game.....0</p> <p>Improving it through systematic practice.....0</p> <p>Not sure.....0</p> <p>5. Spending one's life in many different places.....0</p> <p>Spending most of one's life in one place.....0</p> <p>Not sure.....0</p> <p>6. Work that earns promotion.....0</p> <p>Work that you enjoy doing.....0</p> <p>Not sure.....0</p> <p>7. Planning your leisure.....0</p> <p>Doing things on the spur of the moment.....0</p> <p>Not sure.....0</p> | <p>8. Going to formal evening meetings..0</p> <p>Watching television for entertainment.....0</p> <p>Not sure.....0</p> <p>9. Having your tasks set for you....0</p> <p>Choosing your own activities.....0</p> <p>Not sure.....0</p> <p>10. Investing money in a long term insurance/pension scheme.....0</p> <p>Buying an expensive car.....0</p> <p>Not sure.....0</p> <p>11. Staying in one job.....0</p> <p>Having many changes of job.....0</p> <p>Not sure.....0</p> <p>12. Seldom doing things "for kicks"...0</p> <p>Often doing things "for kicks"...0</p> <p>Not sure.....0</p> <p>13. Going to a party.....0</p> <p>Going to a meeting.....0</p> <p>Not sure.....0</p> <p>14. Leisure activities.....0</p> <p>Work activities.....0</p> <p>Not sure.....0</p> <p>15. Taking holidays in many different places.....0</p> <p>Taking holidays always in the same place.....0</p> <p>Not sure.....0</p> |
|--|---|

16. Going away on holiday for two weeks.....0
 Given two weeks of free time finishing a needed improvement at home.....0
 Not sure.....0
17. Taking life seriously.....0
 Treating life light-heartedly.....0
 Not sure.....0
18. Frequently trying strange foods...0
 Always eating familiar foods.....0
 Not sure.....0
19. Recounting an incident accurately.0
 Exaggerating for effect.....0
 Not sure.....0
20. Spending £100 having an enjoyable weekend.....0
 Spending £100 on repaying a loan..0
 Not sure.....0
21. Having continuity in the place where you live.....0
 Having frequent moves of house...0
 Not sure.....0
22. Going to an art gallery to enjoy the exhibits.....0
 To learn about the exhibits.....0
 Not sure.....0
23. Watching a game.....0
 Refereeing a game.....0
 Not sure.....0
24. Eating special things because you enjoy them.....0
 Eating special things because they are good for your health.....0
 Not sure.....0
25. Fixing long-term life ambitions...0
 Living life as it comes.....0
 Not sure.....0
26. Always trying to finish your work before you enjoy yourself.....0
 Frequently going out for enjoyment before all your work is finished..0
 Not sure.....0
27. Not needing to explain your behaviour.....0
 Having purposes for your behaviour.....0
 Not sure.....0
28. Climbing a mountain to try to save someone.....0
 Climbing a mountain for pleasure..0
 Not sure.....0
29. Happy to waste time.....0
 Always having to be busy.....0
 Not sure.....0
30. Taking risks.....0
 Going through life safely.....0
 Not sure.....0

- | | |
|---|--|
| 31. Watching a crucial match between two ordinary sides.....0 | 37. Reading for information.....0 |
| Watching an exhibition game with star performers.....0 | Reading for fun.....0 |
| Not sure.....0 | Not sure.....0 |
| 32. Playing a game.....0 | 38. Arguing for fun.....0 |
| Organising a game.....0 | Arguing with others seriously to change their opinions.....0 |
| Not sure.....0 | Not sure.....0 |
| 33. Glancing at pictures in a book....0 | 39. Winning a game.....0 |
| Reading a biography.....0 | Playing the game for fun.....0 |
| Not sure.....0 | Not sure.....0 |
| 34. Winning a game easily.....0 | 40. Travelling a great deal in one's job.....0 |
| Playing a game with the scores very close.....0 | Working in one office or workshop.....0 |
| Not sure.....0 | Not sure.....0 |
| 35. Steady routine in life.....0 | 41. Planning ahead.....0 |
| Continual unexpectedness or surprise.....0 | Taking each day as it comes.....0 |
| Not sure.....0 | Not sure.....0 |
| 36. Working in the garden.....0 | 42. Planning a holiday.....0 |
| Picking wild fruit.....0 | Being on holiday.....0 |
| Not sure.....0 | Not sure.....0 |

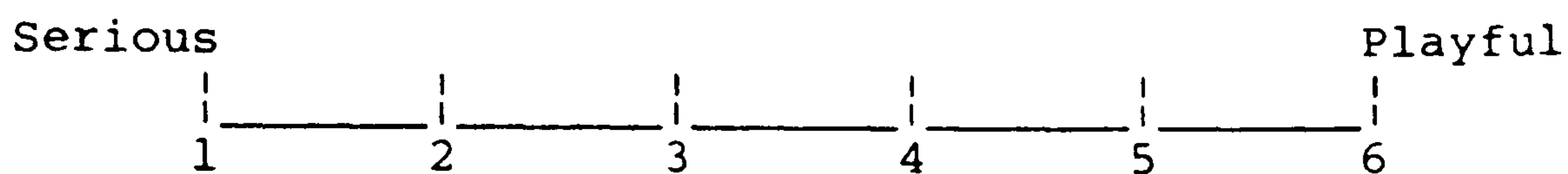
PLEASE MAKE SURE YOU HAVE ANSWERED ALL THE QUESTIONS

APPENDIX B.6: TELIC STATE MEASURE (TSM; SVEBAK & MURGATROYD, 1985)

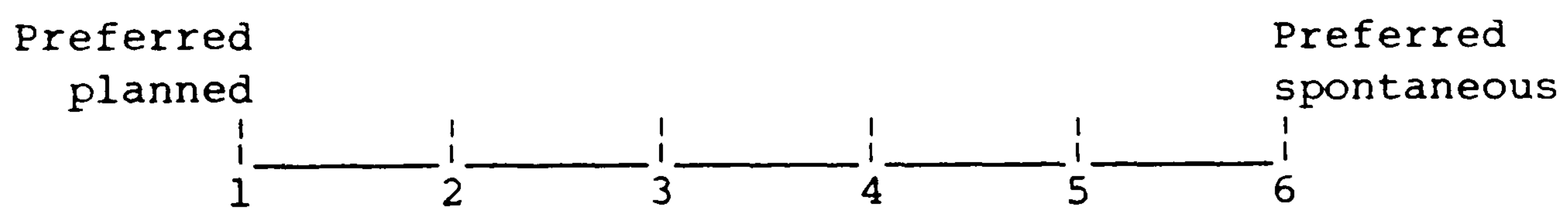
INSTRUCTIONS:

Please rate your feelings during the period of time indicated by the experimenter in terms of the four following rating scales. Do this by circling a number.

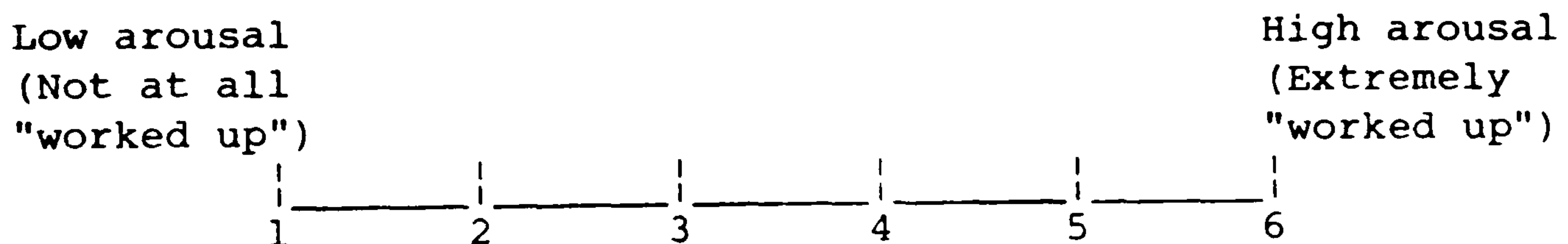
1. Estimate here how playful or serious you felt.



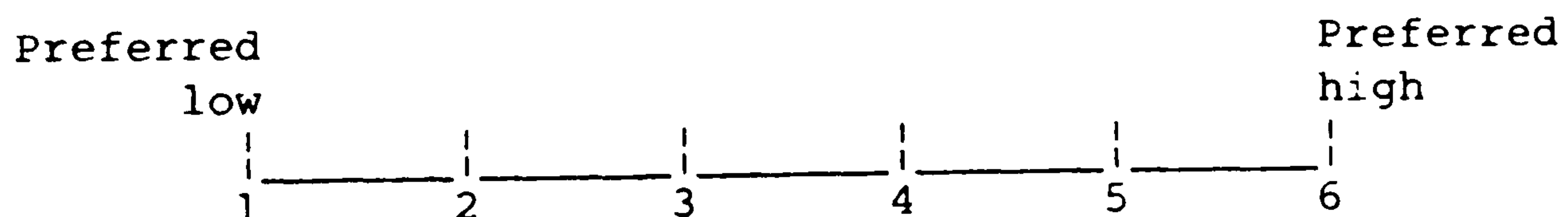
2. Estimate here how far you would have preferred to plan ahead or to be spontaneous.



3. Estimate here how aroused ("worked up") you actually felt.



4. Estimate here the level of arousal (how "worked up") you would have liked.



1. By "serious" here is meant the feeling that you are pursuing (or at least thinking about) some essential goal. For example, the goal may be to achieve something in the future which you believe to be important, or it may be to overcome some real danger or threat in the present.

By "playful" is meant the feeling that you are doing what you are doing for its own sake. In this case your activity is felt to be enjoyable in itself and not to require any further justification. Any goal which there might be is really an excuse for the behaviour.

2. By "planning ahead" is meant trying to organise your behaviour in such a way that it leads effectively to some goal in the (perhaps distant) future, and being aware of the future consequences of your present actions.

By "spontaneous" is meant that your actions are undertaken on impulse, with little regard for future consequences.

Note that this scale asks for your preference at the time in question, rather than your ability to plan or be spontaneous.

3. By "arousal" here is meant how "worked up" you feel. You might experience high arousal in one of a variety of ways, for example as excitement or anxiety or anger. Low arousal might also be experienced by you in one of a number of different ways, for example as relaxation or boredom or calmness.
4. "Arousal" has the same meaning for this scale as for the previous one, but now the emphasis is on the level of arousal you want rather than the level of arousal which you are actually experiencing.

APPENDIX B.7: STRESS-AROUSAL CHECKLIST (SACL; MACKAY ET AL, 1978; COX & MACKAY, 1985)

MOOD ADJECTIVE CHECK LIST

The words shown below describe different feelings and moods. Please use this list to describe **your feelings at this moment**.

If the word **definitely** describes your feelings circle the:

++

If the word **more or less** describes your feelings circle the:

+

If you do not understand the word, or **you cannot decide** whether or not it describes how you feel, circle the:

?

If the word **does not describe** the way you feel, circle the:

-

First reactions are most reliable, therefore do not spend too long thinking about each word. Please be as honest and accurate as possible.

STIMULATED	++	+	?	-	APPREHENSIVE	++	+	?	-
NERVOUS	++	+	?	-	BOTHERED	++	+	?	-
DROWSY	++	+	?	-	SLUGGISH	++	+	?	-
DISTRESSED	++	+	?	-	ENERGETIC	++	+	?	-
TENSE	++	+	?	-	CALM	++	+	?	-
ALERT	++	+	?	-	CONTENTED	++	+	?	-
UP-TIGHT	++	+	?	-	WORRIED	++	+	?	-
SLEEPY	++	+	?	-	TIRED	++	+	?	-
LIVELY	++	+	?	-	IDLE	++	+	?	-
JITTERY	++	+	?	-	ACTIVATED	++	+	?	-
COMFORTABLE	++	+	?	-	UNEASY	++	+	?	-
VIGOROUS	++	+	?	-	RESTFUL	++	+	?	-
ACTIVE	++	+	?	-	CHEERFUL	++	+	?	-
DEJECTED	++	+	?	-	PLEASANT	++	+	?	-
PEACEFUL	++	+	?	-	RELAXED	++	+	?	-

APPENDIX C

TABLES FROM STUDIES 2 AND 3 NOT INCLUDED IN THE TEXT

Study 2, Chapter 4:

Means and standard deviations:

- | | | |
|-----|---|-----|
| 4.1 | Skilled & novice:
TAIS and EPI personality subscales | C.1 |
| 4.2 | Skilled, average & novice:
Telic Dominance Scale | C.2 |

Study 3, Chapter 5:

Winners & losers: Means and standard deviations:

- | | | |
|-----|---|-----|
| 5.1 | Telic Dominance Scale | C.3 |
| 5.2 | Test of Attentional and Interpersonal Style | C.3 |
| 5.3 | Stress-Arousal Checklist: Arousal | C.4 |
| 5.4 | Stress-Arousal Checklist: Stress | C.4 |
| 5.5 | Telic State Measure: Seriousmindedness | C.5 |
| 5.6 | Telic State Measure: Planning orientation | C.5 |
| 5.7 | Telic State Measure: Felt arousal | C.6 |
| 5.8 | Telic State Measure: Preferred arousal | C.6 |
| 5.9 | Telic State Measure: Arousal discrepancy | C.7 |

TABLE C.4.1. Showing mean personality subscale scores and standard deviations for the skilled and novice groups (TAIS, EPI).

PERSONALITY SUBSCALES	NIDEFFER'S 1977 DATA									
	SKILLED		NOVICE		PSYCH STUDENTS		BUSINESS EXECUTIVES		POLICE APPLICANTS	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
NIDEFFER SELF ESTEEM	23.1	(7.1)	19.9	(4.8)	21.9	(5.4)	27.8	(6.8)	27.6	(4.8)
EYSENCK EXTRAVERSION ++	17.1	(4.0)	14.6	(2.9)	-	-	-	-	-	-
NIDEFFER EXTROVERSION	31.9	(5.8)	28.4	(5.1)	27.7	(5.6)	29.8	(5.7)	30.4	(5.1)
NIDEFFER PHYSICAL ORIENTATION	21.0	(3.9)	18.0	(3.5)	16.9	(4.8)	16.2	(4.4)	19.0	(4.0)
NIDEFFER POSITIVE AFFECT EXPRESSION *	24.3	(3.4)	19.4	(2.7)	20.1	(3.9)	21.8	(4.6)	23.4	(3.6)
NIDEFFER INTROVERSION	16.5	(3.3)	18.4	(3.7)	22.7	(4.3)	21.0	(4.3)	19.5	(3.4)
EYSENCK NEUROTICISM *	4.8	(2.4)	8.4	(3.8)	-	-	-	-	-	-
NIDEFFER OBSESSIVE	14.5	(4.2)	15.7	(3.8)	14.4	(2.3)	12.0	(3.2)	13.2	(3.0)
NIDEFFER DEPRESSION *	4.5	(1.7)	6.7	(3.8)	NOT AVAILABLE					

* SIGNIFICANT DIFFERENCES BETWEEN GROUPS ($p < 0.05$)

++ DIFFERENCES BETWEEN GROUPS APPROACHING SIGNIFICANCE
($p = 0.06$)

TABLE C.4.2. Showing mean telic dominance scores and standard deviations for skilled, average and novice squash players (TDS).

GROUP	N	PLANNING ORIENTATION		SERIOUS- MINDEDNESS		AROUSAL AVOIDANCE		TOTAL TDS SCORE	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
SKILLED	12	4.63	(2.45)	4.92	(2.02)	4.46	(2.06)	14.42	(5.52)
AVERAGE	12	5.04	(2.33)	5.42	(2.69)	3.88	(2.67)	14.27	(7.46)
NOVICE	14	4.00	(2.46)	3.75	(1.71)	4.29	(1.65)	12.00	(5.09)
$F_{2,35} =$		0.47		2.08		0.24		0.43	
		p=ns		p=ns		p=ns		p=ns	

TABLE C.5.1. Showing telic dominance and subscale means and standard deviations for winners and losers (TDS).

GROUP	N	MEAN AGE	PLANNING ORIENTATION		SERIOUS- MINDEDNESS		AROUSAL AVOIDANCE		TOTAL TDS SCORE	
			MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
WINNERS	7	20.71	5.57	(1.62)	5.07	(1.06)	4.57	(1.34)	15.21	(2.25)
LOSERS	7	22.71	4.00	(1.98)	5.07	(2.65)	4.64	(1.99)	13.71	(4.69)
$F_{1,12} =$		0.18	2.65		0.00		0.01		0.58	
		p=ns	p=ns		p=ns		p=ns		p=ns	

TABLE C.5.2. Showing a summary of winners' and losers' mean scores and standard deviations on the attentional styles subscales from Nideffer's (1976) Test of Attentional and Interpersonal Style (TAIS).

NIDEFFER ATTENTIONAL SCALES	WINNERS (N=7)	LOSERS (N=7)	$F_{1,12}$
BROAD EXTERNAL ATTENTIONAL FOCUS	12.0 (SD=2.5)	14.1 (SD=3.2)	1.91 p=ns
OVERLOADED BY EXTERNAL STIMULI	19.3 (SD=5.6)	23.9 (SD=6.6)	1.94 p=ns
BROAD INTERNAL ATTENTIONAL FOCUS	15.1 (SD=2.4)	19.7 (SD=4.2)	6.17 p<0.03
OVERLOADED INTERNAL STIMULI	16.1 (SD=4.1)	16.0 (SD=3.5)	0.005 p=ns
NARROW ATTENTIONAL FOCUS	22.0 (SD=3.7)	25.4 (SD=4.4)	2.52 p=ns
REDUCED ATTENTIONAL FOCUS	28.4 (SD=5.8)	31.3 (SD=7.8)	0.61 p=ns
INFORMATION PROCESSING	35.1 (SD=9.5)	45.0 (SD=8.0)	4.39 p=0.05

TABLE C.5.3. Showing winners' and losers' means and (standard deviations) on SACL arousal scale.

GROUP	N	GAME 1 AROUSAL		GAME 2 AROUSAL		GAME 3 AROUSAL		GAME 4 AROUSAL	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST
WINNERS	7	9.43 (3.99)	9.43 (3.15)	9.42 (3.74)	10.85 (1.46)	9.28 (3.45)	10.00 (3.11)	10.00 (2.52)	8.57 (4.39)
LOSERS	7	8.00 (3.10)	10.00 (1.00)	10.42 (1.27)	8.14 (4.09)	6.42 (3.69)	3.86 (3.98)	5.14 (3.58)	3.57 (2.99)
$F_{1,12} =$		0.56 p=ns	0.21 p=ns	0.45 p=ns	2.72 p=ns	2.24 p=ns	10.37 p<0.01	8.62 p<0.05	6.19 p<0.05

TABLE C.5.4. Showing winners and losers means and (standard deviations) on SACL stress scale.

GROUP	N	GAME 1 STRESS		GAME 2 STRESS		GAME 3 STRESS		GAME 4 STRESS	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST
WINNERS	7	8.28 (3.45)	4.57 (2.37)	7.71 (4.19)	4.00 (3.74)	6.71 (3.59)	4.85 (2.41)	7.43 (3.35)	5.00 (2.31)
LOSERS	7	7.14 (6.18)	7.42 (5.50)	7.42 (6.29)	9.00 (5.97)	5.00 (3.32)	5.71 (4.31)	4.57 (4.50)	6.29 (4.75)
$F_{1,12} =$		0.18 p=ns	1.59 p=ns	0.01 p=ns	3.52 p=ns	0.86 p=ns	0.21 p=ns	1.81 p=ns	0.42 p=ns

TABLE C.5.5. Showing winners' and losers' means and (standard deviations) on the seriousminded (SM) subscale (item 1) (TSM).

GROUP	N	GAME 1 SM		GAME 2 SM		GAME 3 SM		GAME 4 SM	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST
WINNERS	7	2.57 (0.98)	2.57 (0.98)	2.00 (1.00)	2.42 (0.98)	2.28 (0.95)	3.00 (1.15)	2.43 (0.98)	2.86 (1.57)
LOSERS	7	2.85 (1.07)	3.14 (2.04)	2.57 (1.39)	4.29 (1.25)	3.57 (1.62)	3.57 (2.07)	3.28 (1.79)	3.57 (1.90)
$F_{1,12} =$		0.27 p=ns	0.45 p=ns	0.77 p=ns	9.57 p<0.01	3.28 p=ns	0.41 p=ns	1.23 p=ns	0.59 p=ns

NOTE: Scores in the 1-3 range indicate the telic state and in the range 4-6 the paratelic state.

TABLE C.5.6. Showing winners' and losers' means and (standard deviations) on the planning orientation (PO) subscale (item 2) (TSM).

GROUP	N	GAME 1 PO		GAME 2 PO		GAME 3 PO		GAME 4 PO	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST
WINNERS	7	3.14 (1.57)	3.29 (1.38)	3.29 (1.38)	3.28 (1.38)	2.71 (1.70)	3.29 (1.38)	2.57 (1.72)	3.29 (1.25)
LOSERS	7	3.00 (1.29)	3.29 (2.05)	3.57 (1.39)	3.71 (1.60)	4.14 (1.57)	4.14 (1.68)	4.00 (1.83)	3.14 (1.46)
$F_{1,12} =$		0.03 p=ns	0.00 p=ns	0.15 p=ns	0.29 p=ns	2.66 p=ns	1.09 p=ns	2.73 p=ns	0.04 p=ns

TABLE C.5.7. Showing winners' and losers' means and (standard deviations) on the felt arousal subscale (FA) (item 3) (TSM).

GROUP	N	GAME 1 FA		GAME 2 FA		GAME 3 FA		GAME 4 FA	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST
WINNERS	7	4.00 (1.29)	4.28 (0.95)	4.28 (1.11)	3.71 (1.11)	4.00 (0.58)	3.85 (0.89)	3.85 (0.69)	4.00 (1.15)
LOSERS	7	3.14 (1.46)	4.14 (1.46)	4.57 (1.27)	3.71 (1.89)	3.29 (1.49)	3.57 (2.07)	3.00 (1.53)	3.28 (1.89)
$F_{1,12} =$		1.35 p=ns	0.05 p=ns	0.20 p=ns	0.00 p=ns	1.39 p=ns	0.11 p=ns	1.83 p=ns	0.73 p=ns

TABLE C.5.8. Showing winners' and losers' means and (standard deviations) on the preferred arousal (PA) subscale (item 4) (TSM).

GROUP	N	GAME 1 PA		GAME 2 PA		GAME 3 PA		GAME 4 PA	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST
WINNERS	7	4.57 (0.98)	4.57 (1.27)	4.85 (0.38)	3.85 (1.22)	4.43 (0.98)	3.71 (1.11)	4.42 (0.79)	4.14 (0.89)
LOSERS	7	4.00 (1.29)	3.85 (1.34)	4.14 (1.57)	3.42 (1.81)	4.00 (1.41)	4.14 (1.77)	4.71 (1.11)	4.43 (1.72)
$F_{1,12} =$		0.87 p=ns	1.04 p=ns	1.36 p=ns	0.27 p=ns	0.44 p=ns	0.29 p=ns	0.31 p=ns	0.15 p=ns

TABLE C.5.9. Showing winners' and losers' means and (standard deviations) on arousal discrepancy (preferred minus felt arousal) (DISC) (TSM).

GROUP	N	GAME 1 DISC		GAME 2 DISC		GAME 3 DISC		GAME 4 DISC	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST
WINNERS	7	0.14 (1.95)	0.14 (2.04)	0.29 (1.70)	0.00 (1.63)	0.00 (1.53)	-0.86 (1.57)	0.43 (0.79)	-0.29 (2.29)
LOSERS	7	0.85 (2.27)	-0.29 (2.43)	-0.43 (1.51)	-0.29 (3.09)	0.71 (2.49)	0.57 (3.26)	1.71 (1.70)	0.14 (2.97)
$F_{1,12} =$		0.39 p=ns	0.13 p=ns	0.69 p=ns	0.05 p=ns	0.42 p=ns	1.09 p=ns	3.30 p=ns	1.02 p=ns

APPENDIX D

GLOSSARY OF REVERSAL THEORY TERMS

APPENDIX D: GLOSSARY OF REVERSAL THEORY TERMS

Allocentric state - A version of the alloic state (qv) in which there is direct interaction between self and other.

Alloic state - A metamotivational state in which pleasure and displeasure derive primarily from what happens to someone else rather than what happens to oneself at the time in question. It forms a pair with the autic state (qv).

Arousal, felt - The degree to which an individual feels himself to be "worked up" at a given time, and in this sense the degree of intensity of his feelings of motivation. The felt arousal dimension defined in this way is different from the sleep-wakefulness dimension. Felt arousal should also be distinguished from tension (qv).

Arousal-avoidance state - A metamotivational state in which the preferred level of felt arousal is low on the felt arousal dimension. It forms a pair with the arousal-avoidance state (qv), and is characterised by an avoidance of anxiety.

Arousal-seeking state - A metamotivational state in which the preferred level of felt arousal is high on the felt arousal dimension. It forms a pair with the arousal-avoidance state (qv), and is characterised by a search for excitement.

Autocentric state - A version of the autic state (qv) in which there is direct interaction between self and other.

Autic state - A metamotivational state in which pleasure and displeasure derive primarily from what happens to oneself rather than what happens to someone else at the time in question. It forms a pair with the alloic state (qv).

Bistability - a system exhibits bistability if it tends to maintain a specified variable, despite external disturbance, within one or another of two ranges of values of the variable concerned. (This contrasts with homeostasis in which only one range of values is involved).

Cognitive synergy - See synergy.

Conformist state - A metamotivational state in which the individual wants, or feels compelled to comply with, some requirement (qv). It forms a pair with the negativistic state (qv).

Dominance - A metamotivational state is said to be dominant, or "state-dominant", if the individual is predisposed to spend longer periods in this state than in the other member of the pair which they together constitute. It implies that there is an innate bias in the individual in favour of one state rather than its opposite, although this may be obscured by environmental influences. It is measured by the Telic Dominance Scale (qv).

Effort-stress - The stress experienced as a concomitant of the expenditure of effort in order to reduce tension-stress (qv): the effort expended to overcome some cause of anxiety or to avoid boredom.

E-state - A state in which the individual experiences the person or persons with whom he is interacting at a given time as an equal. It contrasts with the I-state (qv).

Gratuitous behaviour - Behaviour which is unnecessary, at least in any relatively immediate sense, from the point of view of the survival of the individual or of his family or social group. That is, from a biological, or functional, perspective it at least appears to be superfluous.

I-state - a state in which the individual experiences the person or persons with whom he is interacting at a given time as either inferior to himself or superior. It contrasts with the E-state (qv).

Mastery state - A metamotivational state in which the individual seeks to master (dominate, control, etc.) the other with whom he is interacting at the time. In this state, transactions with the other are seen as involving taking or yielding up. It forms a pair with the sympathy state (qv).

Metamotivational mode - See metamotivational state.

Metamotivational state - A phenomenological state which is characterised by a certain way of interpreting some aspect(s) of one's own motivation. Such metamotivational states as have been identified in reversal theory go in pairs of opposites, only one member of each pair being operative at a given time, but reversal always being possible between members of a pair.

Metamotivational system - a system, presumed to be physiological, which underlies a given metamotivational state (qv), and which generates behaviour performed in that state.

Multistability - A system exhibits multistability if it tends to maintain a specified variable, despite external disturbance, within one or another of a specifiable set of ranges of values of the variable concerned. The simplest case is that of bistability (qv).

Negativism Dominance Scale (NDS) - An 18-item multiple-choice paper-and-pencil test designed to measure the testee's bias towards the negativistic or conformist state, i.e. the strength of the testee's underlying tendency to be predominantly in one state or the other over time. It consists of two subscales: reactive negativism and proactive negativism.

Negativism, felt - The degree to which one sees oneself to be acting against a salient requirement. This should not be confused with the negativistic state (qv).

Negativistic state - A metamotivational state in which the individual wants, or feels compelled to act against, some requirement (whether or not this action is actually carried out). It forms a pair with the conformist state (qv).

Oppositionalism - Telic (qv) self-negativism (qv).

Paradoxical behaviour - Behaviour which is not only unhelpful from the point of view of the survival of the individual or of his family or social group, but which tends to militate against it, and which cannot be explained as error or incompetence on the part of the individual concerned. From a biological or functional perspective it is paradoxical because it has the opposite effect to that which behaviour is supposed to have.

Parapathic emotion - Any emotion felt in an "as if" form. By this is meant that the core of the emotion still has the same feeling quality as its counterpart which goes by the same name; but its meaning to the individual is altered in that it is, as it were, removed one degree from reality and placed in a special phenomenological "frame". An example might be the emotions felt while reading a work of fiction.

Paratelic state - A metamotivational state in which the individual is oriented towards, or feels the need to be oriented towards, some aspect of his continuing behaviour and its related sensations. It forms a pair with the telic state (qv). It tends to be associated with an interest in activity for its own sake, playfulness, spontaneity, and preference for high intensity experiences.

Reversal - In its strictest sense in reversal theory, a reversal is a switch from one metamotivational state being operative to the other member of the pair of states which they together constitute being operative. The term is also used to refer to other kinds of sudden switches between opposites within experience, such as switches between opposite meanings of a given identity.

Satiation - In the reversal theory sense this refers to the way in which, as one member of a pair of metamotivational states (qv) remains operative over time, so some innate force for change builds up in such a way as to facilitate a reversal to the opposite member of the pair of states. Eventually this process of satiation of the operative state may lead to reversal, even in the absence of any other factors which might tend to induce a reversal.

Self-negativism - A form of negativism which occurs when the negativistic state (qv) expresses itself through a desire or compulsion to act against some requirement of the self, rather than against some requirement of an external agency.

Self-tone - A type of hedonic tone which arises from one's perception of oneself and one's own identity, especially in relation to others.

Significance, felt - The degree to which one sees one's actions at a given time in a context which extends beyond the immediate effects of these actions. In particular, the degree to which one sees a goal one is pursuing as nested within a hierarchy of superordinate goals - also known as "goal coherence".

Structural phenomenology - The study of the structure of experience, and the way which the nature of this structure changes over time. It primarily concerns the structure of experience itself, rather than particular structures which occur within experience.

Sympathy state - A metamotivational state in which the individual seeks to be liked by the other with whom he is interacting at the time. In this state, transactions with the other are seen as involving giving or being given. It forms a pair with the mastery state (qv).

Synergy - In the reversal theory sense, this occurs when a given identity is experienced as having opposite or mutually exclusive characteristics, either successively or simultaneously.

Telic Dominance Scale (TDS) - A 42-item multiple-choice paper-and-pencil test designed to measure the testee's bias towards the telic or paratelic state, i.e. the strength of the testee's underlying tendency to be predominantly in one state or the other over time. It consists of three subscales: seriousmindedness, planning orientation and arousal-avoidance.

Telic State - A metamotivational state in which the individual is oriented towards, or feels the need to be oriented towards, some essential goal or goals. It forms a pair with the paratelic state (qv). It tends to be associated with seriousmindedness, planning ahead, and a preference for low intensity experiences.

Telic State Measure (TSM) - A short paper-and-pencil test designed principally to disclose whether the testee is in the telic or paratelic state of mind at a given moment of time.

Tension - In reversal theory, a feeling that accompanies, and is proportional to, any discrepancy between a preferred and actual level of some variable, the preferred level of which characterises a metamotivational state. Unlike arousal, tension is always unpleasant. (cf. arousal, felt).

Tension-stress - The stress experienced as a concomitant of tension (qv). for example, both anxiety and boredom would be experienced as forms of tension-stress. It contrasts with effort-stress (qv).

Transactional outcome, felt - The perceived outcome of an interaction in terms of the degree of gain or loss which it is felt to represent.

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STRUCTURAL PHENOMENOLOGY, AROUSAL AND PERFORMANCE

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SUMMARY Sports psychologists are agreed that the relationship between arousal and performance is crucial to top level performance in sport. Research work which has attempted to monitor and measure changes in arousal levels during performance has been undertaken in an attempt to provide some cognizance of the intricate nature of the relationship. The research methodologies have usually leaned heavily on either physiological or behavioural measures of arousal, yet a clear understanding of the nature of the association between arousal and performance continues to evade even the most dedicated researcher. As far back as 1962 Schachter and Singer found, after examining social and cognitive factors associated with emotional states, that the experience of the individual and his unique interpretation of the situation is a fundamental element in the arousal phenomenon. The same underlying concept plays a central part in reversal theory (Apter, 1982).

This theory is based on what the originators describe as "structural phenomenology", and has proved remarkably versatile in the interpretation of sports behaviour. An understanding of this new approach could be of value to those involved in the study of human movement.

Key words: Structural phenomenology, arousal, performance

INTRODUCTION

Over 20 yr have elapsed since Duffy (1962) commented on the relationship between arousal and performance:

"It appears, then, that it is impossible to state what particular level of activation is most conducive to good performance."

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Little progress seems to have been made; as Rushall (1979) states:

"The relationship between arousal and physical performance has been a much researched topic. The conclusions of all studies really have not produced a definite statement as to how the level of excitedness or arousal of an individual affects athletic performance."

Perhaps Klavora (1979) was close to the truth when he pointed out:

"Coaches are generally confused concerning the emotional levels of athletes before or during competition. Their confusion is most likely a reflection of the uncertainty by psychologists themselves who have still not provided correct answers to the questions related to the arousal-performance relationship in sport practice. The reasons for this are many, but one of the most salient ones is the fact that psychologists have not as yet gone out into the competitive field and directly researched the problem."

What then is the position with regard to understanding the intricate nature of the interaction between arousal and performance in 1986?

LIMITATIONS IN ACCEPTED THEORETICAL APPROACHES

Essentially, to date little further progress has been made although researchers have grappled with the problem throughout the 1970's and early 1980's. Certainly in the UK, and probably elsewhere, there is a good deal of subjective evidence even now, suggesting that sports coaches, especially those working with teams, still base their motivational strategies on the drive theory hypothesis (Hebb, 1955). The theory postulates a direct relationship between level of performance and levels of activation or arousal. Consequently it is argued that by increasing arousal, performance levels will also be increased (fig. 1a). Sports psychologists generally consider this hypothesis to be rather too simple an explanation to be of much practical use and have largely discarded it. However, for a number of reasons, some of which are identified by Klavora (1979), this information has not filtered down to coaches in large enough numbers.

In spite of some quite serious limitations, the enduring theoretical view adopted by sports psychologists has been optimal arousal theory based on the inverted-U-hypothesis (Yerkes-Dodson, 1908; Duffy, 1962; and Leavitt, 1967). This approach considers the relationship between arousal and performance to follow the shape of an inverted-U-curve. It is hypothesized that increases in arousal levels produce corresponding increases in the level of performance up to an optimal point, beyond which any further increases produce a decrease in performance level. Thus the point of optimal arousal is considered to be particularly



FIG. 1a. The hypothesized relationship between arousal and performance according to drive theory.

important as it is thought to be representative of the interaction between arousal and performance which is most conducive to high level performance (figs. 1a and 1b).

A number of authors, including Baddeley (1972), Naatanen (1973), Martens (1974), Welford (1976), Cooke (1981) and Apter (1982), have expressed their reservations about the usefulness of this approach. Nevertheless, a substantial number of research studies were carried out during this time which provided some support for optimal arousal theory.

One important criticism, which can be levelled at the majority of these studies, in a sense underlines a basic weakness in the theory. Baddeley (1972) points out:

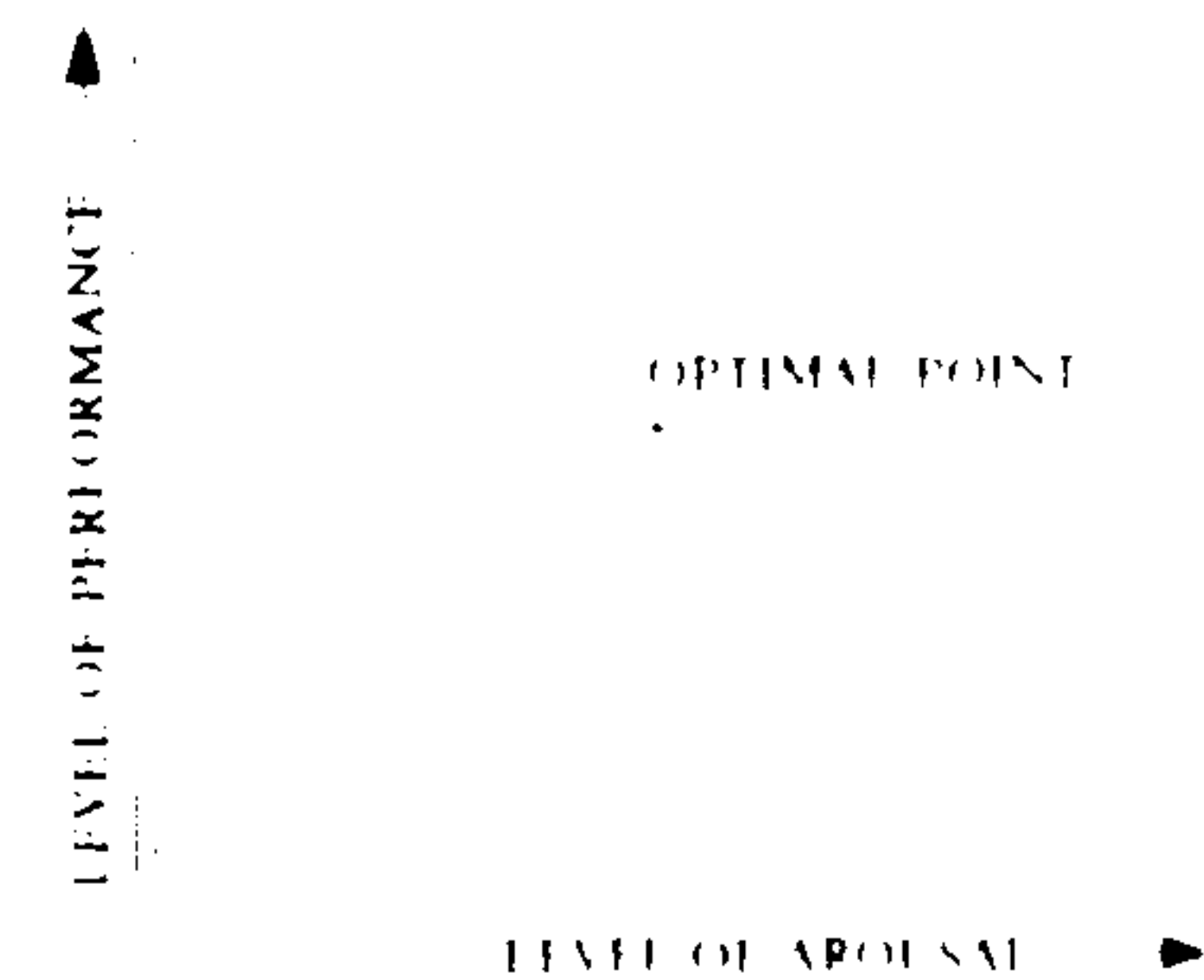


FIG. 1b. The hypothesized relationship between arousal and performance according to the optimal arousal theory.

"One of the major weaknesses as a theory is its ability to account for almost any result so long as the exact location on the U-curve is not specified in advance".

Reinforcing the point, Martens (1974) maintains

"the inverted-U-relationship is more of a post hoc explanation than a hypothesis".

In the light of these criticisms it is interesting to note that 2 of the most recent, and incidentally most comprehensive, texts in motor learning, written by Schmidt (1982) and Kerr (1982) more than 20 yr after Duffy's (1962) statement can offer no other credible theoretical alternative.

RESEARCH IN AROUSAL AND PERFORMANCE

Psychological Research in a Field Setting - An Example

A brief examination of one research study may help the uninitiated understand the problems of researching in this area. Klavora (1978) undertook some field research set in a competitive athletic environment in which he attempted to obtain a more specific insight into the arousal-performance relationship. The subjects for the study were 145 Canadian senior high school basketball players taking part in the 1973-74 City of Edmonton and Province of Alberta championships. The state-trait anxiety inventory developed by Spielberger *et al.* (1970) was used to measure the arousal levels of players prior to games. In addition, after the game the coach provided an evaluation of each player's performance indicating whether it was below, close to, or outstanding in relation to the player's performance ability. For most players, scores were obtained on these 2 dimensions for a minimum of 8 and maximum of 14 occasions, depending on the strength of the team. It may be worth pointing out that the connection between arousal and anxiety, implicit within the study, is well established. Sarason (1980) says:

"Although this relationship between physiological arousal and anxiety is implicitly assumed by many investigators, it has been most explicitly stated by activation theorists (e.g. Duffy, 1962, 1972; Malmö, 1966).

Spielberger's (1966) concept of state anxiety is no exception and is considered to be closely linked to arousal.

Graphically, when the players' arousal levels prior to the game were plotted against their basketball performance scores, bell-shaped curves supporting the inverted-U-relationship were obtained. Klavora pinpoints the 2 most important findings arising out of the study. Firstly, players were found to be performing poorly because they were either under or over-aroused, a finding which is not unusual in studies of this

type. More importantly, the position of "bell-shape" along the pre-game arousal axis tended to vary. Two distinct groups were found, one cluster at the low end of the scale and one at the high end*. Further analysis incorporating trait scores from the Spielberger state-trait anxiety inventory indicated that players whose pre-game arousal was at the low end of the scale scored low on trait anxiety and those at the high end scored high on trait anxiety.

According to Klavora, based on the inverted-U-hypothesis paradigm, the implications are that not one but both required additional arousal prior to games, albeit to a different degree. But even a comprehensive research study such as this one, carried out on a large number of subjects still provides little detailed information about the complex form of the interaction between arousal and performance. Klavora claims, with the aid of the Spielberger state-trait inventory, to be able to identify a "customary level of arousal" recognizable as a range of scores on an arousal continuum. Whether this is helpful or not remains to be seen, although it is a step in the right direction the customary level of arousal is still described as "a range of scores". As a result, a coach who acted on the basis of these findings would still be constrained by fairly general guidelines. Martens (1977) draws attention to this point:

"It is seldom, indeed rare, that athletes are at the real extremes of the A-state continuum. Thus the athlete's concern and that of his coach, is not with gross differences in A-state, but subtle differences that fall between these extremes. These more minute differences are not so easily discerned. Yet, the belief prevails that it is those subtle differences in A-state that often determine whether an athlete fails or succeeds in sport".

Clearly then, there is a need for a more refined measuring instrument. The available state anxiety measures are rather too crude to provide information about small variations in state anxiety. As a result of this the sports psychologist, having tested his subject and obtained state anxiety scores, is not able to provide the coach with information which is of any real practical value. Martens (1977) attempted to provide a more sophisticated measuring instrument with the development of the Sports Competition Anxiety Test. Evaluation of the effectiveness of this new instrument is ongoing.

Psychophysiological Research - A Summary

A productive paper by Krahenbuhl (1975) provides good examples of the psychophysiological research studies which have investigated the

* Interestingly the structural phenomenological approach of reversal theory discussed on page 6 could provide a different explanation of these findings in terms of "metamotivational states" and "instability".

relationship between arousal and performance. In it he undertakes a review of several studies which have focussed on the release of catecholamines and changes in emotional arousal. For instance, in the study by Daniels and Chosy (1972), the subjects were 13 qualifiers for the final 1968 United States Olympic Trials taking part in the middle distance running events. The results indicated that the rate of release of epinephrine increased on race days beyond the measured rates taken on demanding training days. Consequently, mental stress is thought to be closely connected with epinephrine release and norepinephrine release closely connected with the cardiovascular demands of running.

The well-known work of Levi (1967) provides evidence that epinephrine release is a reflection of arousal but is not allied to the particular emotional state. Here adrenaline is thought to intensify all emotions. Studies by Kamano (1968), Singer (1963) and Leventhal and Killackey (1968) have shown this to be true for the emotion of fear. Smith (1973) takes things a stage further, pointing out that whilst catecholamine release always increases with emotional arousal, it does not differentiate between emotions and cannot be assumed to represent progressive increases in stress levels. There is also evidence (Alderman, 1974; Morgan, 1972; and Oxendine, 1970) which suggests that sports performers are idiosyncratic with respect to chronic and situational arousal.

Significantly, Krahenbuhl (1975) is forced to conclude:

"There is general agreement that an individual's unique perception is the critical element concerning adrenaline secretion. That which may appear challenging to one individual (a channel swim) may be threatening to another (who possesses a fear of water). Attempts at unilateral prediction of situational arousal, then appear to be folly, for the infinite variety of human experience insures that athletes will perceive, interpret and respond in unique patterns"

Recognizing the importance of the individual in sporting performance has not always been the central concern of researchers and coaches. Too often they have been guilty of looking for a collectively applicable "template" which they can apply to their athletes. Then, depending on the "fit" athletes are selected or discarded or have particular psychological manipulations applied to them. Rushall (1979) has emphasized the problem.

"... coaches treat all athletes in a similar fashion. A group orientation and universal handling strategy is used. Admittedly, such a strategy is facilitative and expedient for the coach. Because it is easy and simple does not mean that it is the best method. The principle of individual differences is paramount when coaching elite athletes. It is only when an

individual's strengths are maximized and the weaknesses minimized that an athlete has a chance of achieving the true potential of a performance"

THE IMPORTANCE OF INDIVIDUAL INTERPRETATION: A STRUCTURAL PHENOMENOLOGICAL APPROACH

Reversal theory* has been described as a structural phenomenological approach (Apter 1982) and as such provides a most satisfactory theoretical interpretation of the individual's experienced arousal. The behaviour of some sports performers which has been shown to be sensation or stress seeking can be encompassed easily within the bounds of the theory. The important issue of how perceived feelings during high arousal experiences change from fear and anxiety to pleasure and exhilaration can also be explained. (See Kerr, 1983, 1984 and 1985)

Work by Schachter and Singer (1962) has already established that individuals interpret arousal in different ways. According to reversal theory, high arousal may be interpreted as pleasant or unpleasant. This interpretation is linked to the "metamotivational state"† of the individual at that time. Svebak and Stoyva (1980) have outlined how felt arousal and metamotivational state are inter-related.

"In the telic state, low arousal is sought after. In the paratelic state, the opposite is the case; high arousal is the condition sought after. Both the attainment of low arousal in the telic state and the attainment of high arousal in the paratelic state are experienced as pleasant".

Apter (1979) has suggested that a number of metamotivational states exist paired together as opposites. Here the "telic" and "paratelic" preferred states are 2 alternative metamotivational states existing as component features of a bistable system. The concept of a bistable system, crucial to reversal theory, is not dissimilar to a homeostatic

TABLE I Preferred levels of arousal for telic and paratelic metamotivational states

	<i>Telic state</i>	<i>Paratelic state</i>
High arousal	Unpleasant (anxiety)	Pleasant (excitement)
Low arousal	Pleasant (relaxation)	Unpleasant (boredom)

* It will not be possible here to provide a completely comprehensive description of reversal theory. Readers are directed to Apter (1982) for a more detailed explanation.

† A clear definition of terms peculiar to reversal theory is included in the glossary of terms at the end of this paper.

system, except that there are 2 alternative stable states rather than just one preferred state, so that when a change from one metamotivational state to another, say from paratelic to telic, occurs a reversal is said to have taken place. Hence the name "reversal theory". Table 1 shows the preferred levels of arousal for the telic and paratelic metamotivational states.

"Anxiety-avoidance" and "excitement-seeking", 2 other elements in metamotivation which are connected with the telic-paratelic system, are particularly relevant to arousal. Figure 2 illustrates how their interaction can accommodate the 4 experienced states, excitement, relaxation, boredom and anxiety.

From the name "excitement-seeking" it seems obvious that the individual in the paratelic metamotivational state is searching for experiences which will lead to high arousal and the resultant feelings of pleasure or exhilaration. Low arousal is experienced in this state as boredom. In the telic state high arousal would lead to feelings of anxiety rather than the preferred low arousal conditions characterized by the word relaxation.

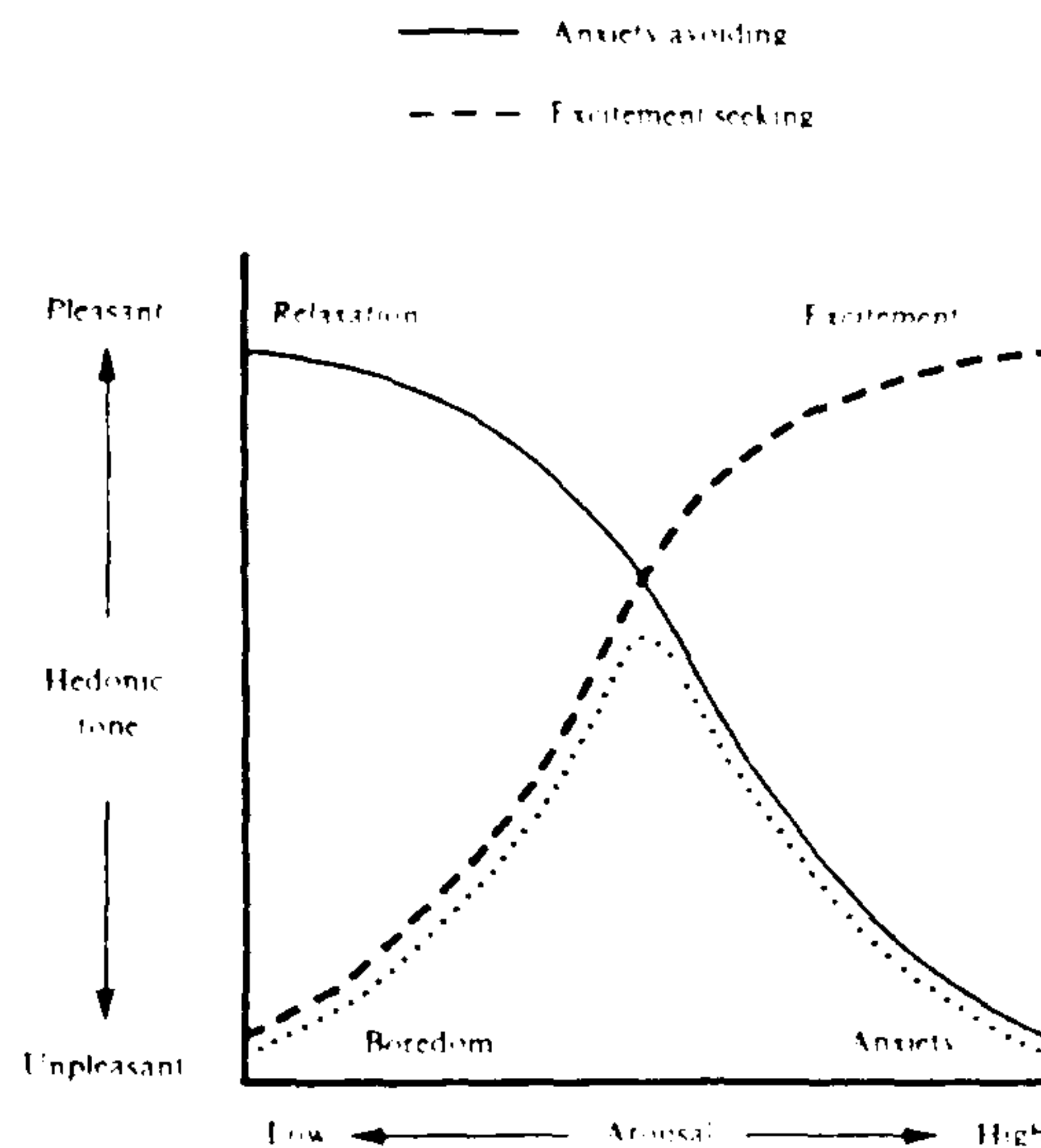


FIG. 2. The hypothesized relationship between arousal and hedonic tone for the anxiety-avoidance and the excitement-seeking systems respectively.

Indeed, it is in accounting for these 4 terms, relaxation, anxiety, excitement and boredom that optimal arousal theory and the inverted-U-hypothesis have difficulty. Whilst some proponents of optimal arousal theory have suggested that excitement is a reflection of moderately high arousal and anxiety is caused by very high arousal, Apter (1982) finds this view unacceptable.

"On the contrary high and low arousal would appear to have forms which are equally pleasant and unpleasant, and any attempts to reduce the distinction between excitement and anxiety to a single dimension will necessarily prove unsatisfactory in this respect."

However, he does concede that, within the bounds of reversal theory intermediate or moderate levels of arousal would still be experienced as pleasant, albeit at a somewhat reduced level. Consequently in Figure 2 an inverted-U-curve can be superimposed on the lower half of the hypothesized x-shaped curve. Nevertheless the theoretical view based on the inverted-U-hypothesis still remains somewhat incomplete. The individual's interpretation of high arousal in different ways is a main consideration in reversal theory's concept of the telic-paratelic metamotivational states. Kerr (1983 and 1985) has reviewed the anecdotal observations of some top level sportsmen proficient in high risk sporting activities. For them high arousal is experienced as pleasant and constitutes an essential element in their continuing participation and high level performance.

INDIVIDUAL BIAS AND REVERSALS: METAMOTIVATIONAL DOMINANCE

Within reversal theory, and applied with the conceptual ideas of bi-stability and reversal between metamotivational states, is the notion of "metamotivational dominance". Dominance is considered to be an innate bias within the individual in favour of one metamotivational state rather than its opposite. In the case of the telic-paratelic pair the Telic Dominance Scale (Murgatroyd *et al.*, 1978) was constructed to measure this bias and to categorize individuals as telic or paratelic dominant. The scale is comprised of 3 subscales: planning orientation, serious-mindedness and arousal avoidance. It should be pointed out that the notion of "dominance" incorporated into reversal theory is fundamentally different to the concept of "traits" found in some other personality inventories (e.g. introversion in the EPI, Eysenck and Eysenck 1969). Metamotivational dominance is the way in which individuals predominantly experience their phenomenological fields. Conceptually this is rather different to the notion of personality traits which are considered enduring features of an individual's behaviour. (For a more detailed discussion of the concept of metamotivational

dominance and in particular telic dominance, readers are directed to Murgatroyd, 1985). A state version of the Telic Dominance Scale is also available

CONTROLLING AROUSAL LEVELS

The notion of optimal arousal is a concept which, of course, is central to the inverted-U-interpretation of the arousal performance relationship. Beyond this point, with further increases in arousal performers are considered to be over-aroused and a resultant decrease in performance is predicted. This postulation became widely accepted amongst sports psychologists and led to a flood of interest in arousal reduction techniques, the idea being that if sports performers became familiar with the use of these techniques they could prevent themselves from going beyond the point of optimal arousal and maintain performance at a maximum

For instance, Nideffer and Deckner (1970), Bell (1976), Kukla (1976) and Suinn (1980) advocated muscle relaxation techniques whilst Reddy *et al.* (1976) and Layman (1978) recommended meditation. Biofeedback, a rather more involved technique, was used by Blais and Orlick (1977), Wenz and Strong (1980) and Zaichkowsky (1980). Hypnosis also has come in for attention with research work carried out by Johnson (1961), Morgan (1972) and Pulos (1979).

Kerr (1986 in press) has suggested, following the arguments of reversal theory, that arousal reduction techniques constitute just one of the available options for intervention. For example arousal reduction techniques may well be appropriate for use with individuals in the telic state. Here high arousal is experienced as unpleasant and one obvious intervention would be to attempt to reduce arousal levels by one of the techniques from clinical psychology outlined above. Conversely, however, for the individual in the paratelic state, low arousal is experienced as unpleasant and any effort aimed at arousal reduction would lead not to relaxation but to feelings of boredom. Consequently, here the use of arousal reduction techniques is completely inappropriate. Indeed, in a discussion of the problems associated with relaxation training, Budzynski, Stoyva and Peffer (1980) have pointed out that not all subjects are able to achieve a state of low arousal when subject to these techniques.

As shown in the diagram (fig. 3), what should now be apparent is that, for certain individuals under certain conditions, it is not arousal reduction that is required but an attempt to increase arousal to high levels. Most references in the literature categorize biofeedback and the other self-regulatory techniques as arousal reducing techniques. Conceivably they could be utilized just as effectively in an innovative

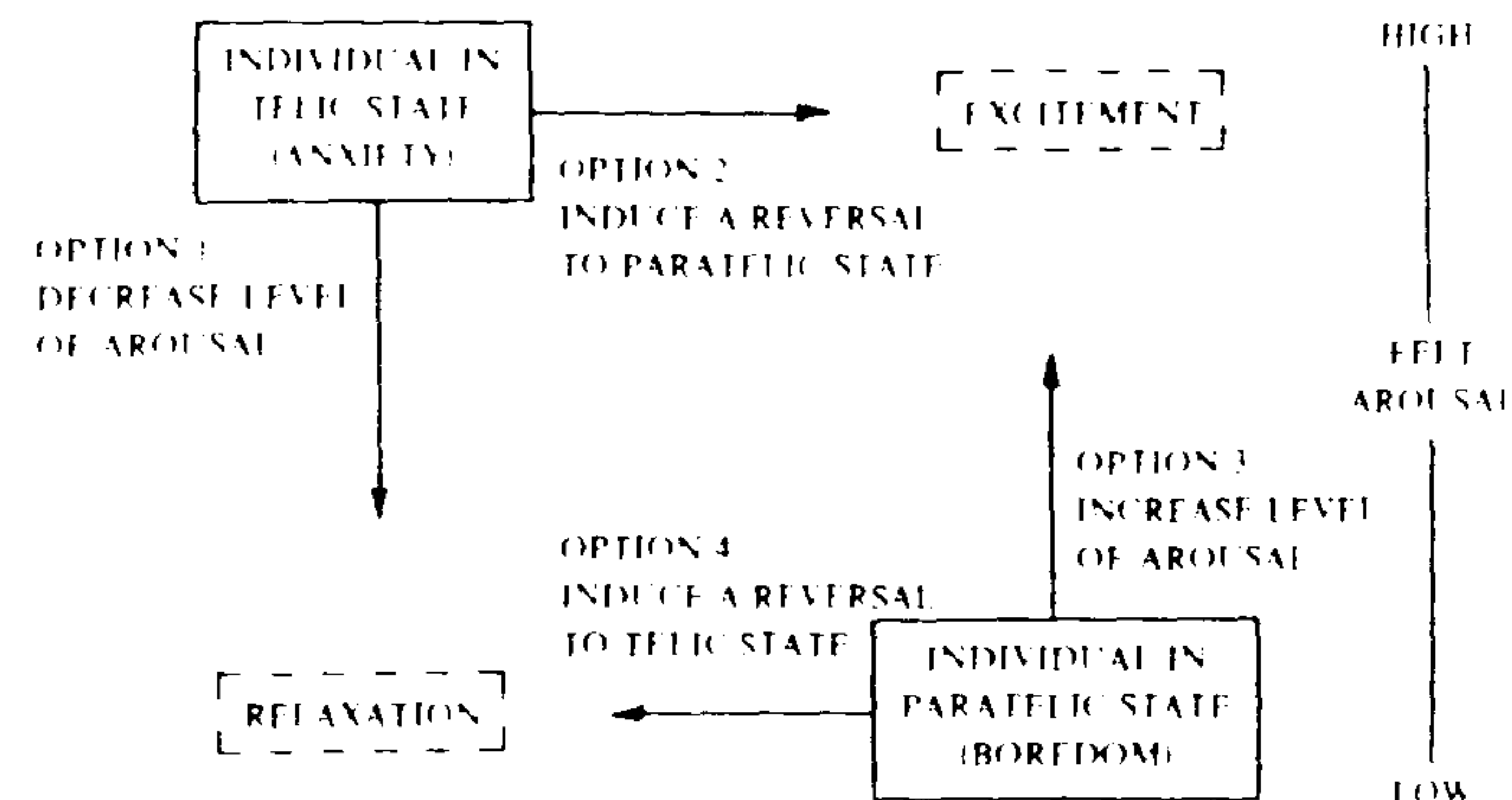


FIG. 3. Possible options for affecting felt arousal.

way, to deliberately increase levels of arousal. (Svebak and Stoyva, 1980). So far the strategies outlined above have dealt with lowering unpleasant high arousal or increasing unpleasant low arousal, but there are 2 other possible strategies

If a metamotivational reversal could be initiated, this would effectively cause a reinterpretation of unpleasant high arousal or unpleasant low arousal. Consider once again the individual in the telic state where high arousal is experienced as anxiety; a reversal to the paratelic state would alter hedonic tone and cause a reinterpretation of the anxious feelings to feelings of excitement. Where appropriate, a switch the other way, a reversal from paratelic to telic, would result in feelings of boredom being changed to feelings of relaxation.

How can these metamotivational reversals be initiated? In addition to the use of self-report 'state' type scales, the training of sports psychologists and coaches, aiding them in the recognition of which metamotivational states were operative, could be undertaken. Individuals also seem to be able to trigger reversals by altering their environment or utilising a cognitive restructuring or imaging strategy. A third approach is being pioneered by Murgatroyd and Apter (1986 in press) who are currently examining the use of psychotherapeutic intervention to trigger or initiate a reversal with its subsequent reinterpretation of arousal levels.

PERFORMANCE UNDER CONDITIONS OF HIGH AROUSAL

Most contemporary writers in sports psychology have adopted Easterbrook's (1959) theoretical stance which considers high levels of

arousal to be detrimental to performance. For instance, based on the work of researchers such as Easterbrook (1959), Broadbent (1971) and Kahneman (1973), high levels of arousal are thought to produce a narrowing of attention. The resultant perceptual narrowing is thought to cause a decrement in performance and some researchers in sports psychology consider this to be additional evidence for the inverted-U hypothesis. (Landers, 1977). Nideffer (1976, 1979) has used this interpretation of the links between arousal and attention as one of the underlying principles of his theory of attentional and interpersonal style. There is, however, some evidence from other literature which would appear to indicate that high arousal can be beneficial to performance. These important experimental findings go some way towards supporting the link between the pleasant experience of high arousal, conceptualized by reversal theory, and performance, outlined previously. According to Epstein (1972), "almost all the phenomena attributed to anxiety are actually consequences of arousal". Spielberger (1966) also observed

"Anxiety states are characterized by subjective, consciously perceived feelings of apprehension and tension, accompanied by or associated with activation or arousal of the autonomic nervous system"

In view of the close association between anxiety and arousal, the research findings outlined below are especially interesting. In an experiment investigating visual angle (Schmidt, 1964), subjects were required to distinguish peripheral cues. The Taylor Manifest Anxiety Scale (1953) was used as a measure of trait anxiety. Subjects who recorded high scores on the scale revealed a broader reporting of stimuli than those with low levels of trait anxiety. Similar results were obtained by Solso, Johnson and Schatz (1968) which indicated an increased range of perception of stimuli with highly trait anxious subjects. Again the Taylor scale was incorporated with the research design. The task in this experiment involved a broad stimulus layout, from which subjects had to pick out as many stimuli as possible.

Cornsweet's (1969) findings showed that when peripheral cues were relevant to the central task, the threat of shock increased the extent to which they were used. These results are underlined by both Landers (1977) and Sarason (1980), who also found when using highly arousing shock, that subjects utilized peripheral cues relevant to the central task to a greater extent than usual.

Adding to the experimental evidence which suggests that a broadened range of cue utilization may result from certain conditions of anxiety is a study by Mendelson and Griswold (1967). They have suggested that, given peripheral cues which are relevant to the central task, increasing levels of anxiety cause a narrowing of the attentional range up to a

certain point beyond which further increases produce a wider range. Their suggestion is based on their research where moderately anxious males were found to be most restricted with respect to utilization of task relevant peripheral cues. Indeed, trait anxiety and the range of task relevant peripheral cues utilized were found to be related in a curvilinear fashion.

If the Easterbrook hypothesis is adhered to then incidental learning should be of low quality. Sarason (1980), however, states

"The assumption that under certain conditions anxiety may produce a broadened range of cue utilization also helps clarify an otherwise confusing state of the data on the relationship between anxiety and incidental learning. Taking into account the Easterbrook hypothesis only, one would have to predict that high levels of anxiety would be associated with relatively poor incidental learning, because utilization of cues necessary to such learning would be hampered"

Dusek, Mergler and Kermis (1975) and Dusek, Kermis and Mergler (1976), in 2 research studies examining trait anxiety on intentional and incidental learning, have found rather different results. A total of 8 cards were placed in a set place within a layout at 2 sec intervals. The layout was covered when all 8 cards were in place and the procedure repeated 5 times. The cards contained line drawings of an animal and a well known household object. For the children who acted as subjects the central task involved recalling the correct position of each animal and the incidental task recollecting the household object paired with each animal. Children who scored high and low on the Test Anxiety Scale for Children were compared. Children who scored high were found to be inferior in learning the central task but superior in terms of learning the incidental stimuli. Here the performance of high-test-anxious subjects on the central task is not unusual in that increased anxiety is thought to produce task irrelevant responses. However, the superior performance in incidental learning by the same group of subjects conflicts with Easterbrook's (1959) position.

Sarason (1980) in trying to explain the results obtained here, finds the analogy used by Watchel (1967) useful. In it attention is compared to a beam of light which may be broad and diffuse or conversely rather more narrow and focussed. According to Easterbrook, of course, the breadth or narrowness of attentional focussing is related to the individual's level of arousal. However, Watchel's analogy goes further and describes how the "beam" may be limited to a small range or can scan a much wider area. Increases in arousal are assumed to have a dual role. Whilst the scanning range is increased the focus of attention on particular points of the field becomes narrowed.

Sarason concludes

"Breadth of scanning may be what led the highly test-anxious subjects to perform better on the incidental task than the less test-anxious. The poorer central learning of the highly test-anxious may have resulted in part from superior incidental performance allocation of attention toward peripheral stimuli may have detracted from attention available for processing central cues"

Given the interaction between, in this case, trait anxiety and arousal, the implication is that high arousal can be beneficial to performance. Clearly this position is at odds with the views of Easterbrook (1959), whose claim is that high levels of arousal produce attentional narrowing and thus negatively affect performance. As already pointed out, Easterbrook's findings have been carried over and applied to the sports context in a particular way (Landers, 1977; and Nideffer, 1976 and 1979). If the experimental results outlined above are applied in a similar manner then there are some important implications for sports performance.

Utilization of peripheral cues and incidental stimuli are an obvious concern of the sports performer. This is especially true for activities such as racquet sports when these factors are crucial to good performance. Consequently, experimental findings which report greater use of peripheral cues and incidental stimuli and a broadening of attentional range with increase in arousal are more than relevant.

There are other more general exceptions to the idea that low levels of arousal are always associated with broad attention and high levels of arousal with a narrowing of attention. For example, the arousal reduction techniques, (meditation or progressive relaxation) outlined earlier, when utilized in techniques such as "autogenic training" (Schultz and Luthe 1959) or yoga type techniques such as transcendental meditation are associated with attention to an extremely limited area of stimulation. In addition, under certain circumstances high arousal can be associated with a difficulty in attending. For example, during the use of hallucinogenic drugs such as LSD an individual, whilst able to perceive colours very vividly, often has difficulty in selectively attending and concentrating on any particular colour.

The relationship between arousal and attentional factors in performance is already recognized as being complex. Clearly there are inconsistencies in their interaction which may be a reflection of intervening phenomenological factors. Consequently, finding a suitable theoretical explanation which could encompass these ideas becomes necessary. The reversal theory interpretation proposed by Apter (1982) could provide the basis of a new theoretical approach to the relationship between arousal and performance. Although Apter (1982) deals with what he describes as "felt arousal", his proposal that a number of

different metamotivational states exist has a good deal of potential. This is especially true for the telic-paratelic metamotivational system and the interaction between anxiety-avoidance and excitement seeking behaviour. It seems possible that the individual's ability to identify peripheral cues and incidental stimuli along with variations in attentional range could be linked to metamotivational dominance and operative state.

CONCLUSION

In terms of psychological theories, reversal theory, with the publication of the first major text in 1982, has arrived relatively recently. On a cautionary note, undoubtedly there is a good deal of research to be carried out, both in general and in the more specific sports context. However, it is hoped that reversal theory might offer sports psychologists, coaches and sports performers an alternative and more useful interpretation of the association between arousal and performance than those already in existence.

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GLOSSARY OF TERMS FROM REVERSAL THEORY

Arousal (felt) Degree to which an individual feels himself to be "worked up" at a given time, and the degree of intensity of his feelings of motivation. (Different from the sleep-wakefulness dimension)

Anxiety-avoidance state Metamotivational state in which preferred level of felt arousal is low, characterized by avoidance of anxiety. Forms a pair with the arousal-seeking state

Arousal-seeking state (excitement-seeking state) Metamotivational state in which the preferred level of felt arousal is high, characterized by a search for excitement

Bistability A system exhibits bistability if it tends to maintain a specified variable, despite external disturbance, within one or another of 2 ranges of values of the variable concerned

Metamotivational state Phenomenological state characterized by a certain way of interpreting some aspect(s) of one's own motivation. Metamotivational states go in pairs of opposites, only one member of each pair being operative at a given time

Paratelic state Metamotivational state in which the individual is oriented towards some aspect of his continuing behaviour and related sensations. Forms a pair with the telic state. Characteristics: activity for its own sake, playfulness, spontaneity, preference for high intensity experience and low felt significance.

Reversal A reversal is a switch from one operative metamotivational state to the other member of the pair

Structural phenomenology The study of the structure of experience, and the way in which the nature of this structure changes over time. That is, it primarily concerns the structure of experience itself, rather than particular structures which occur within experience.

Telic state (Greek 'telos', goal or end) Metamotivational state in which the individual is oriented towards some essential goal(s). Characteristics: serious-mindedness, planning ahead, preference for low intensity experiences and high felt significance

DIFFERENCES IN THE MOTIVATIONAL CHARACTERISTICS OF "PROFESSIONAL", "SERIOUS AMATEUR" AND "RECREATIONAL" SPORTS PERFORMERS

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Summary.— Conceptualised within the Reversal theory of M. J. Apter is the concept of metamotivational dominance. Dominance is the tendency of an individual to spend longer periods in one metamotivational state, rather than in the other member of the pair which they constitute together. This study examined the nature of telic dominance in male sports performers. Three groups of performers categorised as "professional", "serious amateur", and "recreational" were subjects. Telic dominance was measured using the Telic Dominance Scale. Analysis showed that professionals scored significantly higher than the other two groups on 2 of the 3 subscales and on the combined score for telic dominance.

Reversal Theory (Apter, 1982) is a theory of motivation which has developed into a general approach in psychology known as structural phenomenology. The theory particularly concerns the way individuals experience their own motivation and the way in which they structure this experience. One of the basic concepts of the theory is the idea that certain motivational states go together in pairs of opposites which are bistable. Reversals are said to have taken place when a change occurs from one metamotivational state to its opposite in any one pair.

Within the structure of the theory four such pairs of metamotivational states have been hypothesised. These are the telic-paratelic, negativistic-conformist, mastery-sympathy, and allocentric-autocentric pairs. One of these, the telic paratelic pair, concerns felt arousal and is thought to be especially important with respect to the individual's motivation for participating in such activities as theatre, dance, and sport.

It should be emphasised that "telic" and "paratelic" here refer to states and not traits in the traditional sense of the word. In other words, an individual can be said to be paratelic at one moment in time and telic at another. However, individuals are thought to have an innate tendency to be more oriented towards one or other of these paired metamotivational states. The individual is then said to be telic or paratelic dominant.

The Telic Dominance Scale (Murgatroyd, *et al.*, 1978) was developed as a personality measure to highlight differences in the telic or paratelic orientation of individuals. The scale has three subscales labelled "seriousminded-

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ness", "planning orientation", and "arousal avoidance", each one being a feature of telic dominance. Seriousmindedness has been described as the frequency with which an individual is seen to be oriented towards goals regarded as important. Planning orientation is the frequency with which an individual plans ahead in the pursuit of goals rather than taking things as they come. Arousal avoidance is the frequency with which an individual tends to avoid situations which generate high arousal.

The scale has been previously incorporated into other research studies. Fontana (1981) found that high obsessive behaviour was associated with telic dominance. Martin (1983) utilised the scale in the study of humour, stress, and moods, showing that paratelic dominant subjects were more receptive to humour than telic subjects. In addition, he showed that there was a particular relationship between stress and telic dominance. Svecak and Apter (1984) examined Type A behaviour and its relation to telic dominance (seriousmindedness). The findings suggested that individuals categorized as Type A telic-dominant were most at risk with respect to heart disease.

In accordance with reversal theory's conceptualisation of metamotivational dominance, the hypothesis in this study was that individuals participating in sport as a profession would be more telic dominant than serious amateur performers. In addition, serious amateur performers would exhibit higher telic dominance than recreational participants.

METHOD

Subjects

Three groups of subjects ($N = 120$) participated in this study. The first group were 37 professional sports performers whose livelihood came from professional cycling and soccer. The second group was comprised of 38 "serious amateur" performers from field hockey, table tennis, and showjumping, who competed regularly and committed themselves to individual or team practice or training sessions, as well as matches and competitions. The majority of the subjects in this group were of international standard, representing their country in their particular sports. Subjects in these two groups were deliberately chosen from a range of different sports rather than any one particular sport. This was done in an attempt to overcome any idiosyncratic characteristics which might be associated with any single sports activity. The third group was made up of 45 subjects who were not committed to regular practice or training and participated in sports on an occasional basis purely for recreation. The control group were members of the general public who did not participate in sports at all.

Procedure

Subjects were administered the Telic Dominance Scale on a group basis.

The scale consists of three subscales, each with 13 items, making 39 items in total. Each item consists of telic and paratelic alternatives and subjects are asked to choose the alternative they would normally prefer. A 'not sure' response is also included on each item. The items are scored in the telic direction with each telic response scoring one point and 'not sure' responses scoring a half point. A score is obtained for each subscale, and the subscales totalled to obtain the telic dominance score. Following the scoring of the questionnaires the data were subjected to statistical analysis which included frequency distribution and analysis of variance. Probability levels were established at the 5 percent level.

RESULTS

Table 1 shows the mean scores obtained using frequency distributions and analysis of variance for each group on individual subscales and total telic dominance scores. Examining the mean total telic dominance scores, the over

TABLE 1
MEAN TELIC DOMINANCE SCORES

Group	N	Planning Orientation		Serious-mindedness		Arousal Avoidance		Total TDS	
		M	SD	M	SD	M	SD	M	SD
Professional	37	6.08	2.02	6.09	1.74	4.66	2.18	16.80	4.56
Serious Amateur	38	4.75	2.39	3.64	1.70	5.17	2.71	13.54	4.78
Recreational	45	4.64	2.41	4.22	2.17	4.74	2.38	13.12	5.41
Control	20	4.35	2.63	4.60	2.61	5.92	2.35	14.88	5.43
<i>F</i> _{3,136}		3.64		10.15		2.55		4.20	
<i>p</i>		0.05		< 0.05		0.06		< 0.05	

all mean scores of the serious amateurs and recreational sports participants are relatively close. The mean score recorded for the professional group is significantly higher ($p = 0.05$), indicating greater telic dominance.

When the individual subscales are considered, a similar trend is observed in planning orientation and serious-mindedness. Here the professionals have again scored significantly higher ($p < 0.05$) on telic dominance than any of the other three groups, whose scores were rather closer together. On the arousal avoidance subscale the pattern is less clear, with control and serious amateur groups scoring slightly higher than the professionals and the recreational participants. Differences here approached significance ($p = 0.05$). However, generally speaking, these mean scores on arousal avoidance, especially for the three sports groups, are not high and suggest that sports performers show less preference for avoiding arousal than people not involved in sports.

The research hypothesis was partially confirmed. Professional sports

performers were more telic dominant than individuals engaging in serious amateur and recreational sport.

These results are particularly interesting in view of the theoretical predictions made by reversal theory about the nature of individual participation in sports. Sports, by their very nature, often provide the nongoal-oriented, spontaneous, present oriented type of activity which incorporates the low significance and high intensity and arousal associated with the paratelic state. Consequently, the theory predicts that for many people, participation in sports takes place with the paratelic state operative. It also predicts that, for professional and amateur sports performers who take their sport seriously, sport becomes a telic oriented activity. This study set out to examine these ideas empirically by focussing on differences in telic dominance between different groups of sports performers. It has confirmed that, at least for professionals, the motivation to participate in sports is experienced in a different fashion to that of other sports participants.

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COGNITIVE INTERVENTION WITH ELITE PERFORMERS: REVERSAL THEORY

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ABSTRACT

Noticeable in the literature associated with the application of psychology to the area of sport and sports performance in particular has been the increasing frequency of references to the use of cognitive intervention in the sports context. Currently utilised in clinical psychology and behavioural medicine, and receiving increasing attention in sports psychology, are a number of intervention techniques primarily oriented towards altering the individual's level of arousal. These techniques, which have been advocated for use by sports performers as an aid to adapting and coping during competition, have been largely concerned with arousal reduction. This paper presents an alternative approach, the case of reversal theory, a new general theory of psychology concerned with motivation, and emphasises the conceptual implications of this new approach for the use of cognitive intervention techniques in sport.

Key words: Reversal theory, High arousal, Cognitive intervention, Relaxation, Anxiety

INTRODUCTION

Beginning a paper with a cautionary note may be unusual, nevertheless, in this case it seems warranted. It should be pointed out that some of the papers found in the growing literature on proposals for cognitive interventions in sport are positively biased, especially in the claims made with respect to improving sports performance. Some of the reports make claims that in reality cannot be justified and the concerns of some other authors in this respect should not be ignored. As Mahoney (1984), writing about cognitive interventions, points out,

"... it is imperative that a cognitive skills advocate remain both cautious and accountable in making assertions about what an athlete or coach 'should' do to improve performance. Thus, the remarks which follow and those that appear in subsequent sections should be viewed as intervention possibilities rather than direct or confident recommendations. They hardly exhaust the list of possible cognitive skills strategies that might assist athletic performance, and it goes without saying that they are in need of controlled experimental evaluation." (p. 14-15)

Along similar lines, Heyman (1984) states,

"... cognitive interventions are derived from clinical approaches. They are more than just 'techniques'. They were developed as part of therapeutic approaches to psychological and behavioural change. It is not always easy to determine when a sport participant's problems are only related to sport or are more comprehensive, and when the application of a cognitive intervention to the sport problem may be inappropriate." (p. 269).

Whilst the use of cognitive interventions in sport provides a new and exciting challenge for those involved in sports psychology, the different concerns of Mahoney and

Heyman, reflected above, should be kept in mind. Indeed, it is worth noting that some psychologists working in other areas of psychology have yet to be convinced of the value of cognitive interventions (see Wolpe 1976 a & b, and Skinner 1977).

Although sports competitors and coaches have for a long time considered that arousal levels may be an important factor with respect to sports performance, empirical evidence is both contradictory and confusing. This situation has led to rather broad and largely unhelpful generalisations being made about which level of arousal is appropriate for particular sports events, e.g. Oxendine (1984), Landers and Boutcher (1986). The only clear conclusions arising out of research reports and theoretical papers are that individual variations, particularly in mental state, and the nature of the sports events are crucial elements in the arousal-performance relationship.

An example of a rather less generalised approach to the psychological preparation of top level performers is provided by the work of Rushall (e.g. 1982). He has attempted to formulate detailed strategies and competition-specific plans aimed at the enhancement of competitive performance. These strategies and plans are based on research and the results of evaluations of the behaviour of sports performers, the nature of specific sports situations and the characteristics of the sports and their participants. The mental state of the athlete or performer is considered especially crucial and Rushall is one of those who advocates the use of "on-site" intervention techniques should it be necessary. This would occur when the mental state of the performer was thought to be inappropriate for the demands of the particular competition environment. Whilst the competition-specific focus of the work is praiseworthy, its "behaviourist" foundation may mean that the confidence with which his ideas are advocated may not be shared by other researchers.

One particularly enduring notion is that of over-arousal, the idea that the individual performer's level of arousal becomes so high that it interferes negatively with performance. As a result of this, sports psychologists have turned to techniques utilised in arousal control and specifically arousal reduction in an attempt to assist sports competitors to improve the consistency of and increase their performance. These intervention techniques were already being used in clinical psychology and behavioural medicine to help patients relax. Progressive relaxation and autogenic training, along with systematic desensitisation,

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are well-established. The idea of relaxation incorporated in these techniques is used synonymously with the idea of arousal reduction. Biofeedback and transcendental meditation are almost always used with relaxation and the lowering of the individual's level of arousal in mind.

This lowering of arousal, however, need not always be an appropriate strategy to use. There are some authors (e.g. Mahoney, 1984 and Railo, 1982) who are recognising the importance of some sports performers achieving high levels of arousal prior to and during competition. Several recent research studies (e.g. Caudill, et al, 1983) have indicated that increasing subjects' arousal levels or "psyching up" facilitated performance. Stallings states:

"The fact that arousal is, to a large extent, qualitatively specific to the individual may appear to the practitioner to be an insurmountable barrier to the selection of arousal-producing techniques. However, since many of the methods discussed in the section on reducing arousal are designed to increase the individual's awareness of physiological states (e.g. degree of muscle tension), their possible use to teach an individual to increase arousal should be considered." (Stallings, 1982)

In addition, elite athletes interviewed by Garfield and Bennett (1984) reported a number of characteristic sensations associated with top performance. These reported sensations included feelings of "joy", "ecstasy" and "intensity" and the feeling of being "highly energised".

Reversal theory (Apter, 1982) postulates that the motivation of many people for participating in sport is found in the pleasant experience of high arousal which is intrinsic to many sports activities (see Kerr, 1985).

Before attempting to describe the alternatives that reversal theory proposes for cognitive intervention, it is only sensible that a short description of reversal theory be included to assist in understanding the concepts involved. However, this description is by no means exhaustive; readers are referred to Apter's 1982 text for a comprehensive description.

THE THEORY OF PSYCHOLOGICAL REVERSALS: A DESCRIPTION

The theory of psychological reversals is a phenomenological theory of motivation and, consequently, the importance of the individual and the individual's experience is a central feature of its conceptual stance. It is, however, rather different to other phenomenological theories because it attempts to examine human action in a systematic manner and provide a structure to the way in which individuals experience their own motivation. Put succinctly, "structural phenomenology focusses on the different ways in which the contents of experience are interpreted by the individual, rather than on the contents themselves." (Apter, 1982, p. 16).

This individual interpretation means that cognitive and emotional factors play an important role in reversal theory, as does the underlying principle that the behaviour of any individual is inconsistent when considered over time. In other words, there will often be occasions when an individual's behaviour is not consistent with the way they behave in general.

From what has been said so far, it may seem, given the theory's position on the inconsistency of behaviour and its attempt to provide a structure to the individual's experience

of motivation, that forming a conceptual basis for reversal theory is extremely difficult, if not impossible. This might well be the position, except that a number of novel concepts have been proposed by reversal theory which enables it to tackle these difficulties.

The first of these reversal theory concepts has its origins in cybernetics and comes from a development in cybernetics concerned with the understanding of action by means of system models. One specific class of "multistable" systems is characterised by having a variety of alternative preferred or stable states. The bistable system is one type of multistable system and, as its name suggests, has two alternative preferred stable states between which the system finds itself operating at any one time. It is the notion of bistability which has been incorporated into reversal theory to overcome the limitations of the homeostatic system construct currently prevalent in psychology. The homeostatic notion argues that organisms have only one preferred stable state, a fundamental element in a number of other theoretical approaches, for example, optimal arousal theory. However, serious questions have been raised about the usefulness of the homeostatic system approach (e.g. Harlow, 1953; Allport, 1960 and Frankl, 1969).

A very simple example of a bistable system is a light switch which can be either "on" or "off", either of which are stable positions, but any position in between these two is unstable. Bistability in reversal theory means that for an individual, the particular conditions pertaining at the time, such as aspects of the environment or biological functioning, are thought to govern which of the two states is preferred.

The idea of bistability is tied in with two other concepts referred to within the theory as "metamotivational states" and "reversals". Metamotivational states are phenomenological states characterised by the manner in which an individual interprets some aspect(s) of his or her motivation. Four sets of metamotivational states have been identified and have been linked together as opposing pairs (telic-paratelic, negativism-conformity, autocentric-allo-centric, sympathy-mastery). The reason they are linked together as paired opposites may become more obvious if we examine what psychologists usually mean by the word "state" and consider a practical example of how reversal theory encapsulates the notion of metamotivational states. Murgatroyd (1985) points out that,

"The term 'state' in psychology is used to describe something about a person at a given moment in time. States can change quickly, can last for varying durations of time (from seconds to days) and can be affected by environmental cues, interpersonal transactions, cognitive processes, biological changes and motivation." (p. 4)

From this description it is apparent that a state is a somewhat temporary situation and that in time this position will change. This is precisely what is thought to occur between pairs of metamotivational states in reversal theory, with the change which takes place between them known as a "reversal". Take for example the telic-paratelic pair, which is especially relevant to the topic of the motivation and mental states of elite sports performers. In the telic state, the individual is usually serious-minded, planning oriented and has a preference for low arousal. Conversely, an individual would tend to be spontaneous, playful and present-oriented, preferring high arousal and the pleasure

of immediate sensation whilst in the paratelic state (see Table 1 below).

TABLE I
Contrasting characteristics of the telic and paratelic states
 (from Apter, 1982 p. 52)

	Telic	Paratelic
Mean-Ends Dimension	Essential goals Imposed goals Unavoidable goals Reactive Goal-oriented End-oriented Attempts to complete activities	No essential goals Freely chosen goals Avoidable goals Proactive Behaviour oriented Process-oriented Attempts to prolong activity
Time Dimension	Future-oriented 'Points beyond itself' Planned Pleasure of goal anticipation High significance preferred	Present-oriented 'Sufficient unto itself' Spontaneous Pleasure of immediate sensation Low significance preferred
Intensity Dimension	Low intensity preferred Synergies avoided Generally realistic Low arousal preferred	High intensity preferred Synergies sought Make-believe prevalent High arousal preferred

The special relationship that exists between the experience of felt arousal and hedonic tone when in the telic or paratelic states is shown graphically in Fig. 1.

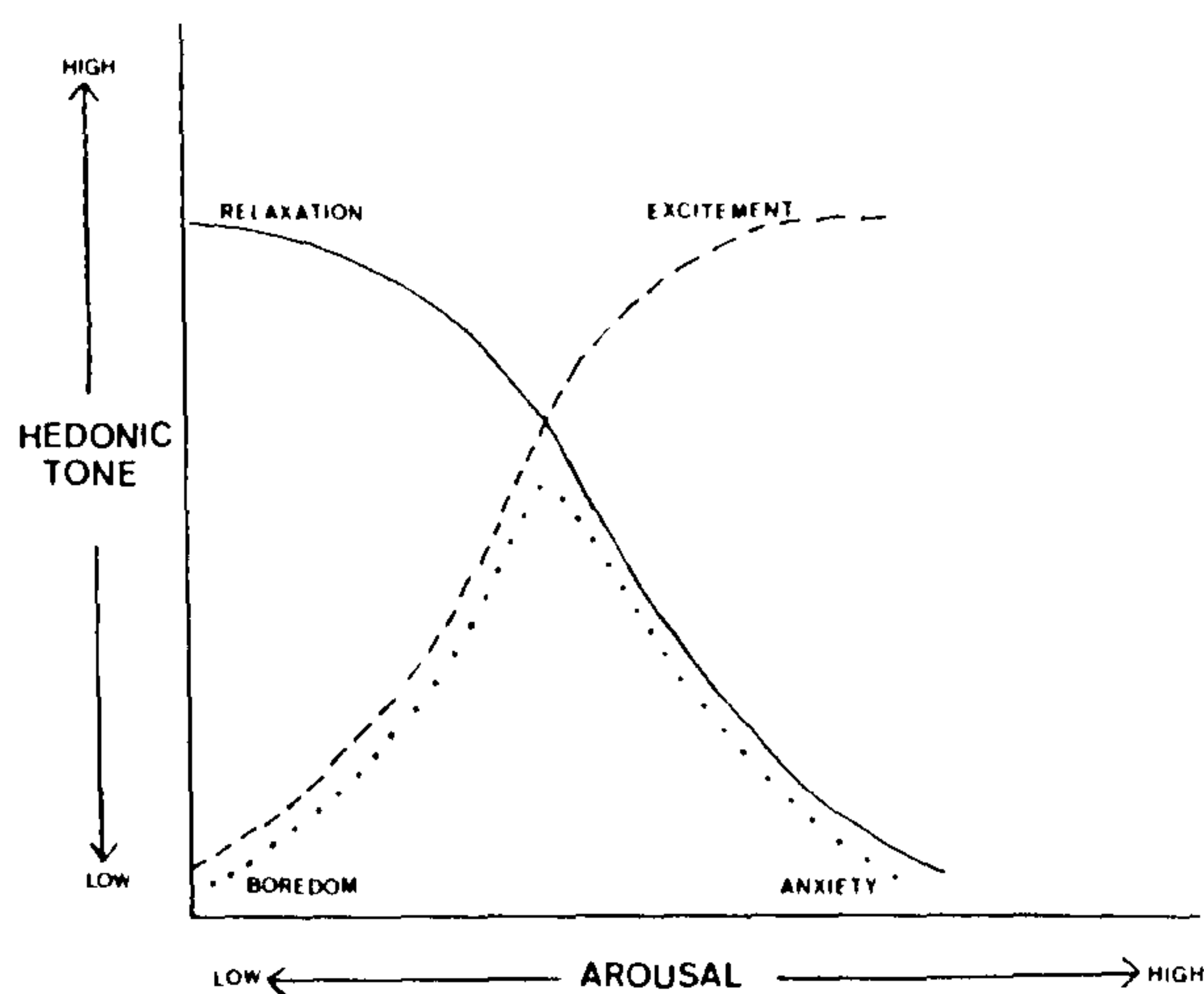


Fig. 1: The relationship between arousal and hedonic tone for the telic state (solid line) and the paratelic state (broken line). The dotted line indicates the single curve of optimal arousal theory (from Apter, 1982).

The four words "excitement", "anxiety", "boredom" and "relaxation", common in everyday speech, capture the feelings associated with high or low felt arousal in the telic and paratelic states.

Apter (1982) uses the example of swimming to illustrate an activity that is often undertaken in the paratelic state,

"As one swims, one experiences the feeling of surging movement, of water streaming over one's skin and the impression of temporary escape from gravity and freedom to move in any direction. All

these may be intense experiences of exactly the kind which are relished in the paratelic state." (p. 59)

Nevertheless, it is dangerous to associate any particular behaviour with any specific mental state. Here, for example, the activity of swimming for the elite swimmer, working towards and competing in high level competition is likely to take on a telic orientation. The concern then is with training schedules, "split-times" and "personal bests".

Incidentally, individuals are thought to have a preference for either of the two metamotivational states and are said to be either telic or paratelic "dominant". This represents an individual bias in the experience of metamotivational states and a scale has been developed to measure this tendency, known as the Telic Dominance Scale (see Murgatroyd, 1985). A person categorised as telic dominant is considered to spend more time in the telic state than in the paratelic state. It should be noted that "dominance" is a rather different notion to that of "trait" common in other personality measures. The idea of a personality trait suggests that the individual's behaviour tends to be consistent and that there is a predisposition to act in a particular way. For example, when an individual is classified as "extrovert" this indicates that extroverted behaviour is a regular and stable characteristic of that individual's personality. The difference is subtle, but important in reversal theory because of its phenomenological base and view of human behaviour as fundamentally inconsistent. In brief, the suggestion from reversal theory is that a person could react in one of two ways, in this instance either telic or paratelic, depending on his/her metamotivational state at the time, with the possibility of switching or reversing between them. So that "the term 'dominant' reflects the ascendancy of one state over another... for a particular person rather than that person's desire to be telic or paratelic: it is the description of what the person actually tends to experience over time rather than a statement about how he or she might wish to be." (Murgatroyd, 1985, p. 20)

By incorporating the innovative concepts outlined above into the reversal theory approach, a unique interpretation of human action becomes viable. The phenomenological framework underpinning reversal theory allows a number of alternative cognitive intervention possibilities to be considered.

POSSIBILITIES FOR THE USE OF COGNITIVE INTERVENTION TECHNIQUES WITH ELITE SPORTS PERFORMERS

Where cognitive intervention techniques have been used in clinical psychology the emphasis has been on arousal reduction. Treatment involving the reduction of arousal levels has proved effective with some patients who have problems controlling anxiety, however, the use of this type of intervention technique may not be effective in all cases. Recent research undertaken by Heide and Borkovec (1983) and Budzinski, et al (1980) has shown that some subjects are unable to achieve a state of low arousal and for others relaxation training can paradoxically induce anxiety.

The general concern amongst sports psychologists is that athletes should be able to control arousal levels in order to find a so-called optimal level of arousal which they consider will be of most benefit in enhancing performance. Here again, the emphasis has been on using arousal-reducing techniques and currently not much attention is being given to other possibilities. Reversal theory, however, suggests that arousal reduction is not the only intervention

possibility and that there are three other equally effective methods open to the therapist (see Svebak and Stoyva, 1980; Kerr, in press).

These alternative strategies, which could be used to change or cause a reinterpretation of arousal levels are outlined in Fig. 2 below.

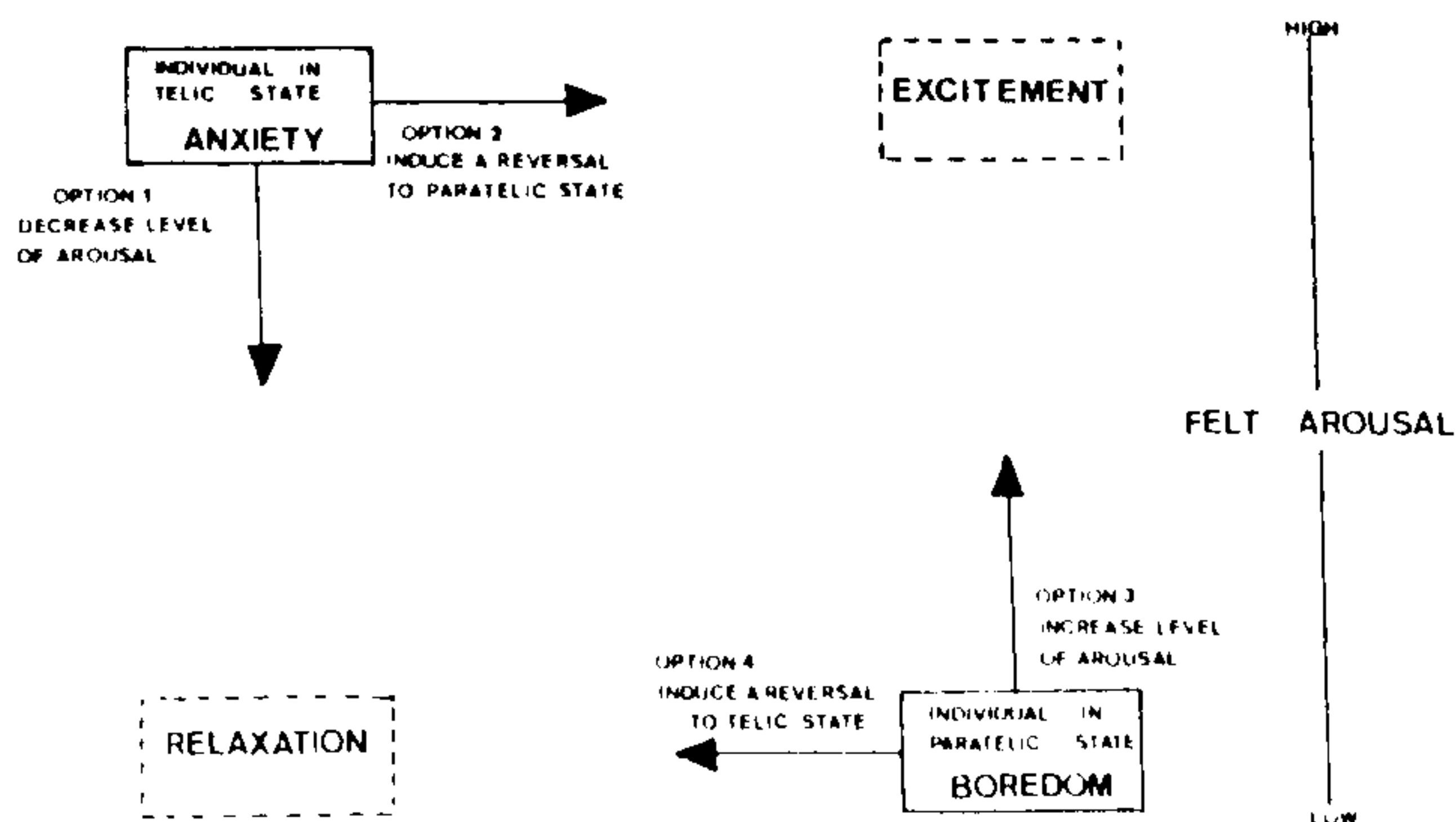


Fig. 2. Possible options for affecting felt arousal (from Kerr in press).

Reversal theory proposes four possible strategies. These are:—

A. High Arousal:

- (1) Reducing the level of *high* arousal, experienced as unpleasant, by utilising one of the techniques described above, for example progressive relaxation.
- (2) Causing a reinterpretation of unpleasant *high* arousal by bringing about a metamotivational reversal (i.e. telic to paratelic).

B. Low Arousal:

- (3) Increasing the level of *low* arousal, experienced as unpleasant by, for example, utilising an innovative biofeedback technique.
- (4) Causing a reinterpretation of unpleasant *low* arousal by bringing about a metamotivational reversal (i.e. paratelic to telic).

Although for the individual in the telic state arousal reduction would be appropriate, resulting in unpleasant feelings of anxiety being changed to pleasant feelings of relaxation, it would be inappropriate for the individual in the paratelic state. Here low levels of arousal are experienced as unpleasant boredom, so what is required is an increase in arousal level which would then be experienced by the individual as excitement. How might this be achieved? One possibility is the suggestion made by Svebak and Stoyva (1980) that biofeedback, one of the self-regulatory techniques, could be used. Subjects would learn to voluntarily increase arousal rather than the opposite.

By effecting metamotivational reversals, two other possibilities for the use of intervention present themselves. These would result in a reinterpretation of arousal, as perceived by the individual, thus changing the hedonic tone. A reversal from paratelic to telic would allow unpleasant feelings of boredom to be reinterpreted as relaxation. On the other hand, high arousal in the telic state, experienced as unpleasant, could be changed to feelings of excitement following a reversal to the paratelic state.

It is imperative, especially prior to or, depending on the event, during competitive performance, to be able to recognise when inappropriate metamotivational states are operative. A "state" type self-report scale, the Telic

Dominance Scale, state version, has been constructed which could be used for this purpose. Sports psychologists, or perhaps coaches who know their team or individual competitors well, could be taught to recognise when an inappropriate metamotivational state is operative. It also seems likely that the sports performers themselves could through experience learn to identify when their operative mental state was not consistent with their usual pre-competitive metamotivational state. It would then be necessary to bring about a reversal.

Reversal theory proponents consider that once the need for a reversal has been pinpointed, an individual, in this case the elite sports performer, could bring about an environmental change in such a way to trigger a reversal. In addition, it is thought that elite performers could induce a reversal by means of a cognitive restructuring or imaging strategy. A recent publication by Murgatroyd and Apter (in press) examines methods for inducing reversals and their usefulness as a means of psychotherapeutic intervention.

CONCLUDING REMARKS

In putting forward the case of reversal theory and its implications for the use of cognitive interventions in sport, the words of caution made at the beginning of the paper are still relevant. Not only is the use of cognitive interventions in sport in its infancy, but so too is reversal theory. In terms of its growth, the first major publication came out in 1982. There is still a considerable amount of work to be undertaken. The empirical and other research investigations carried out to date have been supportive. Reversal theory, like the application of cognitive intervention to the context of sport, holds a great deal of promise, therefore it is important that those people involved with enhancing the performance of elite sports competitors performing at the highest level should be made aware of the possibilities opened up by this new approach.

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GLOSSARY OF TERMS FROM REVERSAL THEORY

ALLOCENTRIC STATE. A metamotivational state in which pleasure and displeasure derive primarily from what happens to someone else rather than what happens to oneself at the time in question. It forms a pair with the autocentric state.

AROUSAL (FELT). The degree to which an individual feels himself to be 'worked up' at a given time, and in this sense the degree of intensity of his feelings of motivation. The felt arousal dimension defined in this way is different from the sleep-wakefulness dimension.

AUTOCENTRIC STATE. A metamotivational state in which pleasure and displeasure derive primarily from what happens to oneself rather than what happens to someone else at the time in question. It forms a pair with the allocentric state.

BISTABILITY. A system exhibits bistability if it tends to maintain a specified variable, despite external disturbance, within one or another of two ranges of values of the variable concerned.

CONFORMIST STATE. A metamotivational state in which the individual wants, or feels compelled to comply with, some requirement. It forms a pair with the negativistic state.

DOMINANCE. A metamotivational state is said to be dominant, or 'state-dominant', if the individual is predisposed to spend longer periods in this state than in the other member of the pair which they together constitute. It is measured by the Telic Dominance Scale.

MASTERY STATE. A metamotivational state in which the individual seeks to master the other with whom he is interacting at the time. It forms a pair with the sympathy state.

METAMOTIVATIONAL STATE. Phenomenological state characterised by a certain way of interpreting some aspect(s) of one's own motivation. Metamotivational states go in pairs of opposites, only one member of each pair being operative at a given time.

NEGATIVISTIC STATE. A metamotivational state in which the individual wants, or feels compelled to act against, some requirement. It forms a pair with the conformist state.

PARATELIC STATE. Metamotivational state in which the individual is oriented towards some aspect of his continuing behaviour and related sensations. Forms a pair with the telic state. Characteristics — activity for its own sake, playfulness, spontaneity, preference for high intensity experience and low felt significance.

REVERSAL. A reversal is a switch from one operative metamotivational state to the other member of the pair.

SYMPATHY STATE. A metamotivational state in which the individual seeks to be liked by the other with whom he is interacting at the time. In this state, transactions with the other are seen as involving giving or being given. It forms a pair with the mastery state.

STRUCTURAL PHENOMENOLOGY. The study of the structure of experience, and the way in which the nature of this structure changes over time. That is, it primarily concerns the structure of experience itself, rather than particular structures which occur within experience.

TELIC STATE. (Greek 'telos', goal or end). Metamotivational state in which the individual is oriented towards some essential goal(s). Characteristics — serious-mindedness, planning ahead, preference for low intensity experiences and high felt significance.

Telic Dominance in Masters Swimmers

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KERR, J.H. & VAN EIJNDEN, H.J. Telic Dominance in Masters Swimmers. *Scand. J. Sports Sci.* 9(3): 85–88, 1987. The present study examined the motivational characteristics of 38 Masters swimmers (mean age 39.4 years). The sample included national, international and Olympic level swimmers. Motivational characteristics were examined from the perspective of reversal theory, both psychometric and interview techniques were used in the investigation. The results indicate that the motivational characteristics of the masters swimmers were similar to those of professional sports performers. Thus, in addition to the interview material, provided some evidence to support the theoretical arguments of reversal theory.

Key words: Masters swimmer, motivation, reversal theory, telic dominance.

Since the first Masters swimming meeting held in 1970 (Rahe & Arthur 1975), increasing attention has been paid to the participants by sports science researchers. A number of studies have examined particular facets of Masters swimmers' performance (e.g. Rahe & Arthur 1975; Hardy 1984), and physiological factors have been studied by, for example, Dummer et al. (1985). This increase in research interest is perhaps best illustrated by the fact that a sports medicine symposium was held to coincide with the 1st world Masters Games held in Toronto, Canada in 1985.

Few studies have attempted to investigate the psychological characteristics of Masters athletes or more specifically Masters swimmers. Why is it that these sports performers continue to compete into middle and old age?

This study set out to examine the motivational characteristics of Masters swimmers with particular reference to telic dominance. It did so from the

perspective of reversal theory, a new and innovative approach to motivation and personality which considers human behavior to be intrinsically inconsistent. For a comprehensive description of reversal theory the reader should consult Apter (1982), or, for its application to sport, Kerr (1985).

Briefly, the theory of psychological reversals or, as it is usually known, reversal theory concentrates on the way in which individuals experience their own motivation and the structure they apply to that experience. As a result it also focuses on cognitive and emotional aspects of that experience. The theory proposes a number of new concepts which challenge the theoretical stance of some other theories of motivation. 'Bistability', a central concept of reversal theory, is in direct conflict with the concept of homeostasis, a building block of, e.g. optimal arousal theory (see Apter 1982 p. 82).

The idea of homeostasis suggests that an organism has only one preferred stable state; bistability, on the other hand, argues that there are two equally stable preferred states between which the individual alternates. These stable states in the theory are known as 'metamotivational' states and the changes between them are known as 'reversals'. These reversals are thought to be induced by (a) contingent events – a change in the environment, (b) frustration – the needs of a person are not being satisfied in one metamotivational state, or (c) satiation – the longer an individual is in one state, the greater the likelihood of a reversal. Metamotivational states are "phenomenological states characterised by a certain way of interpreting some aspect of one's own motivation" (Apter 1982). They go together in pairs of opposites, and one of the four pairs of metamotivational states, the telic-paratelic pair, is the main concern of this study.

When individuals are in the telic state their behavior is usually serious, planned, often directed to the future achievement of some goal, and generally in this state low arousal is preferred. Conversely, in the paratelic state the individual is usually spontaneous and playful, unconcerned with future events, content to experience the pleasure of immediate sensation from some non-essential activity, and has a preference for high levels of arousal. Individuals are thought to reverse between these two states depending on the particular conditions pertaining at the time. However, it has been shown that individuals have a disposition for one or other of these metamotivational states (Murgatroyd 1985). This disposition can be gauged by examining a person's score on a psychometric inventory known as the Telic Dominance Scale developed by Murgatroyd et al. (1978).

Previous work carried out by this author (Kerr 1987) had identified significant differences, on the planning orientation ($F(3,136) = 3.64$ $p < 0.05$) and serious-minded subscales ($F(3,136) = 10.15$ $p < 0.05$) and overall telic dominance ($F(3,136) = 4.20$ $p < 0.05$), between 'professional' and 'serious amateur' and 'recreational' sports performers. In total, 120 sports performers divided into the three categories mentioned above, along with 20 control subjects participated in this earlier investigation. The first group was comprised of professional cyclists and soccer players, the second group consisted of field hockey, table tennis and show-jumping performers, most of whom were of international standard and trained and competed on a regular basis. The third group took part in sports occasionally, purely for recreational purposes. To overcome any idiosyncratic characteristics which might have been associated with performers from one particular sport, subjects were deliberately chosen from a range of sports. The results of this earlier study were used for comparative purposes in this study.

Svebak and Murgatroyd (1985) first proposed a multimethod approach to understanding metamotivational dominance. In addition to using the psychometric instrument, i.e. the Telic Dominance Scale, they initiated the use of interview techniques as a source of supplementary information about the way an individual interprets his or her phenomenological world. It was thought that the incorporation of interview techniques into the research design of this study might also prove beneficial.

Methods

The subjects in this study were 38 Masters swimmers (27 males, 11 females) aged 25 to 57 years, (mean 39.4 years). Eight of the subjects had swum at national level, 12 at international level and five in the olympic games. The subjects were asked to complete the Telic Dominance Scale on a group basis.

The Telic Dominance Scale is a 42-item psychometric inventory with three individual subscales comprised of 14 items. On each item, subjects must make a choice between the telic and paratelic option, indicating which of the two activities they would normally prefer to do. Item 4, for example, asks subjects to choose whether they "would prefer to improve a sporting skill by playing a game or improve it by systematic practice". The scale is scored in the telic direction with each telic response given a score of one point. There is also a "not sure" response in each case, which is given a 1/2 point, should the respondent be unable to choose one of the first two options. Scores for each subscale are computed separately and then totalled together to give an overall score for telic dominance.

One subject agreed to participate in an interview and it was undertaken before the telic dominance scores were available. He was a 36-year-old former Dutch swimming champion. In addition to competitive swimming, he has also competed successfully in the 'Ironman' triathlon competition held in Hawaii and the 'Elfstedentocht', an eleven city ice skating race over some 200 km of the waterways of Friesland.

Results

Telic dominance scale

The mean scores of the Masters swimmers on individual subscales and overall telic dominance were calculated and statistically analysed using frequency distribution and anova techniques. The results are shown in Table 1.

A close resemblance was noted to the telic dominance scores obtained with professional sports performers in an earlier study (Kerr 1987). The Masters swimmers scored slightly higher on planning orientation (6.68 vs 6.08), slightly lower on serious mindedness, (5.58 vs 6.09) and slightly higher on arousal avoidance (5.29 vs 4.66). These differences were not significant, however, once again the total score for Masters swimmers on telic dominance, calculated by adding the scores of the three individual subscales, was found to be similar to that of the professionals. No significant differences were found between the two groups.

The scores of the Masters swimmers were also compared with the scores of the serious amateurs and the recreational sports performers from the earlier study. Significant differences between groups were found as regards planning orientation ($p < 0.0005$) and serious-mindedness ($p < 0.0005$) but not on arousal avoidance ($p = ns$). Significant differences were also found between these groups on overall telic dominance scores ($p < 0.0005$). The motivational characteristics of the Masters swimming subjects, as far as telic dominance was concerned, were found to parallel those of the professional sports group.

Table 1. Mean telic dominance and subscale scores for Masters swimmers compared with serious amateur and recreational sports performers (from Kerr 1987).

Group	N	Planning orientation		Serious-mindedness		Arousal avoidance		Telic dominance	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Masters swimmers	38	6.68	2.48	5.57	2.07	5.29	2.36	17.36	4.79
Serious amateurs	38	4.75	2.39	3.64	1.70	5.17	2.71	13.54	4.78
Recreational	45	4.64	2.41	4.22	2.17	4.24	2.38	13.12	5.41
F(2, 18)		8.80		9.06		2.25		8.49	
P		0.0003		0.0003		NS*		0.0004	

* NS = not significant

Interview material

Examination of the telic dominance subscale scores revealed that just over 25 % of the subjects exhibited a rather similar pattern of characteristics, i.e. relatively high scores on serious-mindedness and planning orientation, with correspondingly low scores on the arousal avoidance subscale. The subject who participated in the interview was found to be in this subgroup.

However, a degree of caution is warranted in the consideration of the results of the interview. As only one subject was interviewed, any conclusions based on the outcome of this single interview can only be tentative. On the other hand, the comments made in the interview do provide further insight into the personality and motivational characteristics of this sportsman, which may have implications also for the other subjects studied. The results of the interview are discussed along with the results of the telic dominance scale in the discussion.

Discussion

The subjects' scores on the Telic Dominance Scale indicate that the motivational characteristics associated with their participation are similar to those of the professional group studied by Kerr (1987). Likewise, these characteristics differ greatly from those of the serious amateurs and recreational sports performers from the same study. In other words, Masters swimmers are on average significantly more telic dominant than these two latter groups. Apter (1982) has proposed that sports activities, although usually engaged in whilst the individual is in the paratelic state, may on occasion take on a telic orientation. It thus seems that sport is a telic experience for Masters swimmers who continue to dedicate themselves to training and competition at the top level for their age group.

This is not surprising, because if a swimmer is to succeed at the top level then pool time is very important. Swimming training by its very nature is a rather serious affair, carefully planned, involving repetitive lengths up and down the pool, usually with a strong

emphasis on achieving certain times. Constant evaluation against the clock is a fundamental part of swimming training.

It is apparent from the interview that telic orientation is an aspect of competitive swimming, and especially of training, that the subject experienced as enjoyable: "I really can say that I liked 95 % of all the training I did in my life." It seems likely that a good deal of this enjoyment comes from the feelings of pleasure that are associated with the satisfaction of goal achievement. The interviewee's scores on the telic dominance scale support this view. On planning orientation and serious-mindedness he scored 9 and 7.5 respectively; both scores are higher than the group means on both scales. The telic nature of these scores also ties in with his comments about the triathlon event in Hawaii:

In spite of all the pain and effort it was all worth it. There were three objectives that I wanted to reach: finish the job; a certain time, a certain position. I said to myself that I had to finish somewhere between number 50 and number 150 out of 900 and I had to finish in the top 10 of (the) swimming (event). I was satisfied...

In connection with the Masters games in Toronto a similar telic flavor to his description comes out:

I had 8 weeks for training and I wanted to do it seriously now. When I started training, the motivation came back. I got in a rather good (physical) condition... I went to Canada very optimistic... I felt comfortable. I said to myself 'try to win every time you swim' and I tried it very hard. I wanted to swim very hard, I didn't seem to do anything else. I didn't win but I was satisfied.

Another intriguing feature of the interview revolves around the subject's statements about international competition, and thus highlights a discrepancy between the subject's scores on the first two telic dominance subscales and the third one, arousal avoidance:

I enjoyed them very much and I always did my best on the big occasions. It has been like that all my life, always better on international occasions.

This swimmer recorded a low score (2) on the arousal avoidance subscale. It might have been expected that,

given his relatively high scores on the other subscales, he would also have scored highly on arousal avoidance, providing him with a high overall score on telic dominance. In fact, along with the other swimmers in this subgroup of the main sample, the subject's score on the arousal avoidance subscale was very low. Murgatroyd (1985), has pointed out that this is consistent with reversal theory, being accounted for in theoretical terms and reflected in the somewhat lower correlations that exist between this subscale and the other two.

The inherent nature of international swimming competition is such that the performers experience high, or very high, levels of arousal. Along with the challenge of competing against other highly trained, top performers, the pre-race activity of warming up, the large numbers of spectators and the anticipation of tremendous physical effort all act as factors contributing to the levels of experienced arousal. How this high arousal is interpreted by the individual performer depends greatly on whether the individual is in the telic or paratelic metamotivational state.

In the telic state low arousal and in the paratelic state high arousal is preferred. The emphasis here is on 'preferred' because it is possible for the high arousal associated with a swimming competition to be tolerated by persons in the telic state in order to achieve the highly significant goal they have set themselves.

The pattern which emerges from this study indicates that Masters swimmers take their sport seriously and are intent on competition. Their training, so important for competitive swimmers, is planned carefully with set targets or goals, which take the form of achieving certain times, a crucial element. This training

is geared to some competitive event in the future where, if they achieve the set goals, they will feel satisfaction. In addition, at least some of the subjects in the sample enjoyed the high arousal associated with these competitive events and, at least the interviewee has always been able to perform well under conditions of high arousal. (More detailed information of the interview material can be obtained from the authors.)

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