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Chapter 4

OPTIMAL LEVELS OF ANXIETY, INTENSITY, OR AROUSAL

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Welsh golfer Ian Woosnam entered the final round of the 2001 British Open tied for the lead. He drove his first shot within six inches of the hole and scored a birdie 2 on the par-3 first hole of the final round. Prior to the start of the second hole, he was informed that he would be assessed a two-shot penalty for having 15 clubs in his bag, one over the limit. Earlier that day, he experimented with two drivers, and his caddy neglected to remove the extra club prior to the start of play. When informed of the penalty, Woosnam said he "went ballistic," and later explained: "At the moment, it felt like I had been kicked in the teeth. It's hard enough to be level with the best players in the world. To give them a two-shot advantage wasn't something I was feeling too good about" (Sherman, 2001, p. C7).



Optimal levels of intensity (photo courtesy of Western Connecticut State University)

Woosnam *pared the second hole but made bogeys on holes three and four. He said, "It took me a few holes to recover" (Sherman, 2001, p. C7). He did make an eagle on the sixth hole and birdies on holes 11 and 13. His final round score was 71, four strokes behind the tournament champion, David Duval. This unfortunate incident caused Woosnam to state: "I didn't really get it out of my head all the way around" (Shain, 2001, C1).*

Mental skills and practices that promote and sustain optimal performance are the subjects of Chapters 4, 5, and 6. These techniques are intended for use during and immediately prior to competition, performances, and practice. However, just as physical skills must be practiced frequently and conscientiously, mental skills must be mastered during practice if they are to be useful during competition. The regular practice of mental skills also promotes better general well-being or psychological adjustment. Psychological skills that are practiced at times more distal to performances, such as goal-setting and the promotion of self-efficacy, also foster better psychological adjustment and are the subjects of Chapters 8, 9, and 10. Performance suffers if general well-being is poor, if thinking is dysfunctional, and if mental disorders are present.

STRESS AND PERFORMANCE

Performances, competitions, examinations, and evaluations are often stressful. Although there is not a universally accepted definition of stress, the **cognitive-relational theory** of Lazarus and Folkman (1984) has proven heuristic and influential:

Psychological stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being. (p. 19)

Stress is therefore understood to involve an environmental event and an individual's cognitive appraisal of the environmental challenge or threat (Folkman et al., 1991; Lazarus & Folkman, 1984). This appraisal process begins with an interpretation of whether the sources of stress or *stressors* impact important areas of functioning and whether one has resources adequate to cope with the magnitude of the stress (Ruiz & Hanin, 2011). There are four alternative appraisals. The event may be interpreted as a source of *harm/loss* if damage has already occurred or as a *threat* if there is potential for future damage. Alternatively, when stressors are considered to present a *challenge*, people feel joyous about ensuing struggles. Finally, environmental events are understood to be sources of *benefit* if they bring opportunities for advancement or success (Lazarus, 1999).

To illustrate, anticipated evaluations, performances, and competitions may be interpreted as threatening and sources of stress to the unprepared sportsperson. However, the same competitions might be welcomed as opportunities for advancement, recognition, and fun by the prepared

sportsperson who feels equal to the challenge. When sportspersons interpret the stress of competition as a challenge, they are more likely to maintain confidence that they can control the action (Anshel, Kim, Kim, Chang, & Eom, 2001; Neil, Fletcher, Hanton, & Mellalieu, 2007). Very important competitions, such as championship games, may be sources of both high risk and opportunity, as the threat of loss and opportunities for advancement and recognition are heightened.

The cognitive appraisal of sources of stress is accompanied by emotional responses. Feelings of sadness, anger, guilt, and relief often occur with appraisals of loss. Anxiety, worry, and fear may be generated by appraisals of threat. Feelings of excitement, eagerness, and hopefulness may result from appraisals of challenge.

Application

During competition, appraisals and judgments—such as about the likely results of competition, the strength of the competition, and how one is doing—are likely to be distracting. These self-reactions and self-reflections (Bandura, 1997; Kitsantas & Zimmerman, 2002) should be saved until after competition. When attention is diverted from the moment-by-moment process of competition, performance suffers.

Stress and Coping

There are different ways of coping with situations that are seen as taxing or exceeding the resources of the person. Coping consists of what a person thinks or does in response to stressors. These thoughts and actions may change as situations unfold, and they may be relatively specific to stressors in specific environments (Nieuwenhuys, Vos, Pijpstra, & Bakker, 2011). There are three general categories of coping responses (Chesney, Neilands, Chambers, Taylor, and Folkman, 2006; Nicholls, Polman, & Levy, 2010). **Problem-focused coping** involves efforts to manage, change, or master the problem or challenge that is the source of stress. There are many examples of problem-focused coping, and those more relevant to the focus of this book include goal-setting, following regimens to prepare for evaluations and allowing adequate time for preparations, time management, visualization immediately prior to athletic performance, and self-talk to sustain concentration during competition. **Emotion-focused coping** concerns attempts to regulate emotional responses to the source of stress. Relevant examples of emotion-focused coping include the interpretation of stressors as challenges rather than as threats; engaging in relaxation, meditation, and physical exercises; and obtaining emotional support from others.

Social support is a form of **interpersonal coping** and consists of well-intentioned actions from other people. Examples of social support are: emotional support, esteem support, informational support, and tangible assistance (Bianco & Eklund, 2001; Chesney et al., 2006; Freeman,

Coffee, & Rees, 2011; Rees & Hardy, 2004). High-level British tennis players who received emotional and informational support maintained flow states (see Chapter 2) and avoided staleness despite the pressure of competition (Rees & Hardy, 2004). Tangible support helped to ameliorate technical problems and flatness and sustained flow despite competitive pressure.

With esteem support, athletes are more likely to feel in control of competitive situations and to interpret them as challenging rather than as threatening. With esteem support, athletes may come to believe that they have sufficient resources to manage the stress of competition. Esteem support was shown to be more influential than emotional, informational, or tangible support in determining the experience of control during competition among elite and skilled British golfers (Freeman & Rees, 2009). Esteem support improved not only their perception of control but also their scores. With more esteem support, a diverse group of British athletes recorded higher self-confidence and less "reduced sense of accomplishment" (Freeman, Coffee, & Rees, 2011, p. 68). In addition, with more informational support, athletes were less likely to devalue their sport and to register emotional and physical exhaustion.

Emotion-focused coping, such as interpreting the stress of competition as a challenge, may involve a cognitive reframing of experience. Avoidance-focused and appraisal-focused coping also focus on reformulating and reinterpreting experience (Cox & Ferguson, 1991; Giacobbi, Foore, & Weinberg, 2004; Kowalski & Crocker, 2001; Krohne, 1993). Avoidance-focused coping consists of efforts to ignore or discount the importance of stressors. It has been seen as desirable when the sources of stress are uncontrollable and transient, such as a "bad" call from a referee in sport. By ignoring the bad call, sportspersons avoid distractions and focus on aspects of performances that are under their control. Appraisal-focused coping refers to efforts to put current stressors in perspective by using logical analyses.

People differ in the degree to which they use problem- and emotion-focused coping. Problem-focused coping is also associated with the perception of control, whereas emotion-focused coping is correlated with the opposite (Anshel & Kaissidis, 1997; Daly, Brewer, Van-Raalte, Petitpas, & Sklar, 1995; Gaudreau & Blondin, 2002). In general, responses to problems or challenges that can be successfully resolved or mastered are more adaptive if they involve a greater proportion of problem-focused coping. More specifically, problem-focused coping is preferable when the sources of stress can be identified and controlled, and when it is necessary to stay "on task" for extended periods of time in order to master stressors (Roth & Cohen, 1986). Sources of stress for which there is no solution are responded to more successfully with greater proportions of emotion-focused coping. For example, major athletic injuries prompt worries about whether recovery will be complete, and athletes manage these worries by visualizing full recovery (Udry, 1997). It is clearly important to correctly size up a situation as changeable or uncontrollable and to also have effective problem- and emotion-focused coping skills.

Golfers were more satisfied with their performances and recorded better scores when they used task-oriented coping (similar to problem-focused coping; Gaudreau, Nicholls, & Levy, 2010). Mentally tough athletes are more likely to use problem-focused coping and are less likely to use emotion-focused coping strategies such as denial, humor, and behavioral disengagement (Kaiseler, Polman, & Nicholls, 2009). Mental toughness involves resistance to distractions, obstacles, adversity, and pressure, and a hearty work ethic. It also includes the capacity to "maintain concentration and motivation when things are going well to consistently achieve your goals" (Gucciardi, Gordon, & Dimmock, 2008, p. 278).

In many stressful situations, such as elite competition, all forms of coping are utilized as athletes attempt to both manage stress in the environment as well as their emotional reactions (Weston, Thelwell, Bond, & Hutchings, 2009). For example, U.S. Olympic wrestlers (Gould, Eklund, & Jackson, 1993), U.S. National Champion figure skaters (Gould, Finch, & Jackson, 1993), and U.S. professional soccer players (Kristiansen, Murphy, & Roberts, 2012) simultaneously used both problem-focused, such as conscientious practice, and emotion-focused strategies, such as relaxation techniques, for coping with the stress of competition and training. Other elite athletes and performance artists handled the stress of performances with not only avoidance-focused and appraisal-focused coping, but also with problem-focused and emotion-focused coping strategies (Poczwardowski & Conroy, 2002). The majority also remembered failing to cope sufficiently with stressors.

Coping and Mental Skills

Problem-focused, emotion-focused, and avoidance-coping strategies were all practiced by Irish adolescent international golfers. They interpreted situations and emotions positively, avoided stressful situations, and kept to pre-shot routines when coping well with the stress of competition (Nicholls, Holt, & Polman, 2005). Welsh international adolescent golfers primarily utilized problem- and avoidance-focused strategies—especially avoiding stress—to cope with the stress of practice and competition. They rated physical errors, mental errors, tough competition, and weather as the primary sources of stress (Nicholls, Holt, Polman, & James, 2005). Mental and physical errors and injuries were recognized most frequently as sources of stress in training and competition among professional rugby union players in the United Kingdom. They used problem-focused coping, such as increasing concentration and effort, emotion-focused coping, such as reinterpreting their experience in positive terms, and avoidance coping, such as withdrawing from the source of stress (Nicholls, Holt, Polman, & Bloomfield, 2006). U.S. professional soccer players engaged problem-, emotion-, and avoidance-focused coping strategies and interpersonal support to manage stress (Kristiansen et al., 2012).

Clearly, some people are more effective than others in coping with the stresses of examinations and performances. The mental skills and

procedures discussed in this and ensuing chapters serve to improve coping strategies in close proximity to competitions. A key to understanding why these mental skills and techniques are helpful is that they increase awareness of phenomenology or psychological states during competition. Psychological states are more readily controlled when they are identified (Bortoli, Bertollo, Hanin, & Robazza, 2012; Ravizza, 2010). This process of identifying psychological states is referred to as *insight* or awareness, and a leitmotiv, or theme, in psychology, psychiatry, and philosophy is that awareness allows for greater control of thoughts and behavior. Corrective action can follow when problems with arousal level, preperformance preparation, attention, self-talk, concentration, and imagery are identified. The experience of control is fundamental to managing stress and anxiety.

ANXIETY, INTENSITY, OR AROUSAL LEVELS AND PERFORMANCE

The regulation of anxiety levels is related to optimal performance and doing one's best on tasks involving evaluation. The terms *anxiety*, *arousal*, and *intensity* have at times been used interchangeably. The practice of equating the terms has been criticized (Zaichkowsky & Baltzell, 2001; Uphill, 2008), but has continued. Some sport psychologists prefer the term *intensity* to *anxiety* or *nervousness*, because the latter refer to negative or dysfunctional conditions, or to *arousal*, as this latter term has been used to signify sexual responsiveness (Taylor, 1996). However, in terms of sports psychology, *arousal* has been defined as the activation of the body's resources for intense activity (Landers & Arent, 2010). *Arousal* refers to a general state of alertness, and *arousal* varies on a continuum from deep sleep to intense excitement (Gould & Udry, 1994). *Intensity* is defined as a condition within people that has an energizing function on the body and mind (Taylor & Wilson, 2002). It affects performance in the physiological, motor, and the cognitive domain. The physiological domain consists of the levels of heart rate, glandular and cortical activity, and blood flow. The motor area refers to behaviors such as changes in pace and coordination. The cognitive domain consists of the person's thoughts and emotions.

Descriptions of anxiety also often involve the identification of cognitive and physiological, or somatic, domains. The *cognitive* component consists of worries and apprehensions about the results of evaluations, potential failures, and personal inadequacies. The *physiological* component consists of reactions of the sympathetic nervous system, such as muscle tension, elevated heart rate, sweating, and feelings of being keyed up or on edge. Cognitive anxiety is particularly disruptive to athletic performance (Chamberlain & Hale, 2007; Jones, Swain, & Cale, 1991; Sanchez, Boschker, & Llewellyn, 2010; Smith, Bellamy, Collins, & Newell, 2001). These domains of anxiety are distinct, but intercorrelated. In other words,

the experience of cognitive anxiety is more likely with the accompanying experience of physiological anxiety (Craft, Magyar, Becker, & Feltz, 2003).

Anxiety that is activated in response to specific situations, such as evaluations, has been referred to as **state anxiety**, whereas anxiety levels that remain relatively stable across situations and over time are considered **trait anxiety** (Spielberger, Gorsuch, & Lushene, 1970). It may also be important to distinguish between the cognitive and physiological activity that occurs when someone prepares for an evaluative event and the cognitive and physiological reactions to external input (Hardy, Jones, & Gould, 1996). In this context, reactions to external input are described as arousal and imply a lack of preparation for the external stimuli. Activation refers to the cognitive and physiological preparation for evaluative events. Not surprisingly, sportspersons with higher levels of trait anxiety are more likely to experience state anxiety prior to competition (Hanton, Mellalieu, & Hall, 2002; Mullen, Lane, & Hanton, 2009).

In the pages that follow, the terms arousal, intensity, and anxiety will be used in discussing the results of research. The use of these terms will follow the practices of the authors of this research, and generally reflects differences in the measurement of these constructs. For example, in some studies, questionnaires to measure anxiety were used, whereas in others questionnaires were used to assess arousal. Readers are advised to refer to the definitions of arousal, intensity, and anxiety as necessary to clarify these concepts.

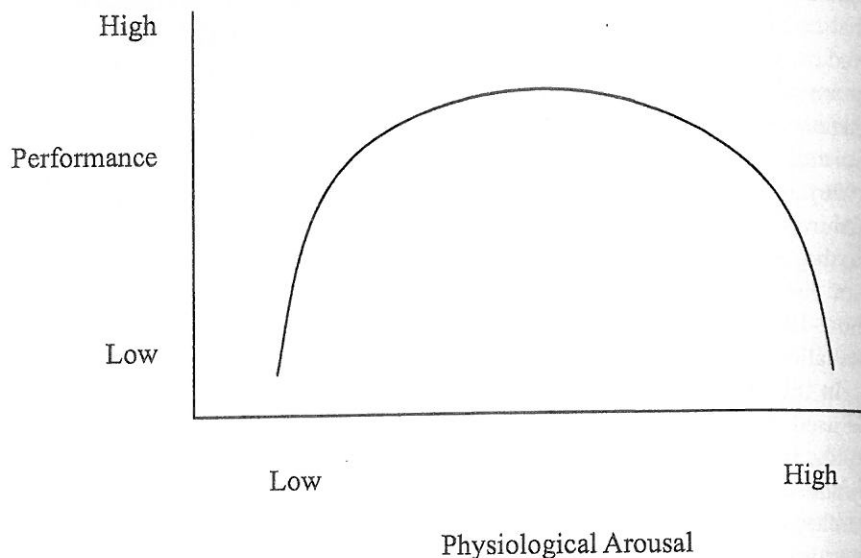
Inverted-U Hypothesis

An early theory for conceptualizing the relationship between arousal and performance was the **inverted-U hypothesis** (Yerkes & Dodson, 1980). The tenet of this influential theory was that performance was poor when arousal was low. Performance improved as arousal rose to moderate levels, but then declined when arousal exceeded an optimal level (Arent & Landers, 2003; Levitt & Gutin, 1971). Therefore, a graph of this relationship between arousal and performance was curvilinear, or had the appearance of an inverted-U (Figure 4.1).

The effects of arousal on performance differ for tasks that require sustained concentration versus sustained information transfer (Humphreys & Revelle, 1984). Performance on tasks that required sustained concentration was shown to decrease as arousal increased. The human capacity for concentration is limited by the amount of information that can be sustained and processed in working or active memory at any given time. Working memory has an executive function, in that it allows for the prioritization of cognitions and behaviors and the inhibition of distracting information and stimuli (Engle, 2002; Kane, Conway, Hambrick, & Engle, 2007). Working memory is situated in the prefrontal cortex.

The average limit of working memory is seven units of information, and the active memory of most people falls within a range of five to nine units (seven plus or minus two; Kareev, 2000; Miller, 1956). As will

FIGURE 4.1 The Inverted-U arousal-performance relationship



be explained later, arousal may compete with other information for the allocation of the approximate seven units of storage space in working memory and lead to poorer performances as arousal increases.

Performance on tasks that consist of sustained information transfer was shown to improve as arousal increased (Hardy et al., 1996). Sustained information transfer tasks do not require the maintenance of information in working memory or the transfer of information from working memory to long-term memory for permanent storage. Instead, they consist of simply remaining vigilant for signals and producing responses when

the signals appear. Many tasks, however, do not simply involve working memory or sustained information transfer, but some combination of these mental processes. For example, a tenacious defender in basketball does not simply respond to the play of opponents. Instead, the defender draws on his or her knowledge of the tendencies of opponents and anticipates their play. The relationship between performance and arousal on these complex tasks does appear to correspond to the inverted-U, or curvilinear, graph. One possible explanation for this is that a moderate amount of arousal provokes optimal working memory capacity and sustained information transfer. Too little arousal results in performance



Physiological arousal and task requirements
(photo courtesy of Western Connecticut State University)

deficits on complex cognitive tasks because of deficient vigilance and preparation to respond (sustained information transfer) and too much arousal erodes performance due to competition for the allocation of working memory resources. Most generally, performance improves when arousal levels match task requirements (Landers & Arent, 2010).

Consistent with the history of science (Kuhn, 1970), there were anomalies that were not explained by the inverted-U hypothesis. Among these was the finding that the levels of intensity that were most facilitative for performance were different for different people (Landers & Arent, 2010; Whelan, Epkins, & Meyers, 1990).

Zone of Optimal Functioning

An understanding that people were different in terms of the level of arousal or anxiety associated with their best performance was integral to the current model of the **Individualized Zone of Optimal Functioning** (IZOF; Hanin, 2000a, 2000b). The IZOF was a refinement of the individual optimum zone model and the zone of optimal function model (Hanin, 1980; 1986). An individual might find his or her IZOF by regularly measuring the level of anxiety and his or her corresponding performances at various tasks. For example, athletes would assess their anxiety levels prior to or after a number of performances, and attempt to replicate the level of anxiety experienced prior to their best performances. This process enhances awareness of emotional states associated with optimal performance, as well as emotional conditions accompanying poor performances. Anxiety level could be assessed empirically by completing a questionnaire such as the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) or the sport-specific Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990) or Sport Anxiety Scale (SAS; Smith, Smoll, & Schultz, 1990). Athletes may also receive counseling and guidance from sport consultants to become aware of the content and intensities of emotions associated with optimal performance (Robazza, Pellizzari, & Hanin, 2004; Woodcock, Cumming, Duda, & Sharp, 2012).

Successful sportspersons appear more capable of achieving and maintaining their desired level of physiological arousal and of experiencing this arousal as pleasant and not a source of stress (Hanin, 2000c; Kerr, 1997). Poorer performance is associated with deviations from optimal levels (Prapavessis & Grove, 1991). Optimal performance is not necessarily associated with low levels of arousal (Hanin, 2007). For example, squash players who competed in city and county teams in England, and members of the England National Under-19 squash team who won simulated tournaments experienced high but pleasant levels of arousal throughout the four matches of the tournament (Kerr & Cox, 1991).

Levels of precompetitive anxiety associated with optimal performances have been shown to vary considerably. Perhaps athletes with higher levels of trait anxiety, or who experience higher levels of anxiety not only prior

to competition but also throughout their days, perform more optimally with higher levels of precompetitive anxiety (Raglin & Turner, 1996). Elite Belgian climbers were shown to climb optimally when experiencing high levels of physiological anxiety prior to competition. Their physiological anxiety was accompanied by positive affect, eagerness, and focused concentration (Sanchez, Boschker, & Llewellyn, 2010).

Elite athletes have been distinguished from non-elite athletes on the basis of performance-enhancing emotions prior to competition (Robazza & Bortoli, 2003). The IZOF model may also be less applicable to sub-elite performers than to elite athletes, as the former may be less capable of recognizing their anxiety levels associated with optimal performance (Thelwell & Maynard, 1998).

Research with collegiate female varsity softball players called into question the validity of the IZOF, and unlike previous studies concerning the IZOF, measured both cognitive and physiological anxiety (Randle & Weinberg, 1997). Subsequent research with measures of both cognitive and physiological anxiety (CSAI-2) have underlined the importance of identifying optimal preperformance states for individuals rather than groups because these states differ considerably among athletes (Annesi, 1998). Detailed discussions of how people differ in terms of their reactions to challenges and stress and of the influence of temperament and personality on performance will be presented in Chapter 15.

A further refinement of the IZOF has been to identify a range of emotions in addition to anxiety that is associated with optimal performance (Hanin, 2004, 2007; Hanin & Stambulova, 2002; Ruiz & Hanin, 2004; Woodman et al., 2010). To simplify, emotions are categorized on the bases of hedonic tone (pleasure or displeasure) and functional impact on performance (optimal or dysfunctional). The same emotion might be perceived quite differently by separate athletes. For example, anger, joy, and anxiety might be perceived as pleasant or unpleasant, depending on its functional impact on performance (Martinent & Ferrand, 2009). The athlete who performs well when angry would likely find it to be hedonically pleasing, because it serves the purpose of enhancing performance (Robazza, 2006; Ruiz & Hanin, 2011). These athletes may deliberately try to feel angry before competition (Lane, Beedie, Devonport, & Stanley, 2011). Athletes with a predominance of functional-pleasant and functional-unpleasant emotions are more capable of mobilizing and utilizing energy productively (Robazza, Bortoli, & Hanin, 2004; Robazza, Pellizzari, Bertollo, & Hanin, 2008). Conversely, with a predominance of dysfunctional-pleasant and dysfunctional-unpleasant emotions, sportspersons are more likely to be lethargic and distracted (Hanin & Stambulova, 2002).

Emotional states influence performance and performance influences emotional states. Emotional states are therefore subject to fluctuation in the course of competition. Not surprisingly, dysfunctional-unpleasant emotions follow poor athletic performances and successful performance results in optimal facilitative-pleasant emotions (Pellizzari, Bertollo, & Robazza, 2011).

Optimal performance is predicted more accurately when the IZOF is considered in conjunction with physiological measures of vigilance. Results with elite Italian air-pistol shooters indicated that more accurate shots were preceded by decelerating heart rates and levels of skin conductance—both measures of arousal (Bertollo et al., 2012).

Application

How does one arrive at optimal emotional states for competition? Emotional states are elicited with the conscientious practice of the preperformance routines reviewed in Chapter 5. Familiar routines promote efficacy and feelings of control. In the course of this practice, disruptive anxiety and arousal may be noticed and used as a cue to begin coping strategies. Methods for decreasing physiological anxiety are reviewed in Chapter 7.

Catastrophe Theory

Research with the inverted-U theory and early studies of the IZOF model have been criticized because it involved conceptualizations of anxiety or arousal as unidimensional. Catastrophe theory was postulated with the understanding that anxiety was a function of both physiological arousal and cognitive anxiety or worry (Gould & Udry, 1994; Hardy, 1990, 1996; Woodman & Hardy, 2001). The relationship between physiological arousal and performance was seen to be essentially the same as that outlined by the inverted-U hypothesis when cognitive anxiety was low. However, when cognitive anxiety was high, the deceleration of performance was extreme or catastrophic when physiological arousal (again, some authors refer to this construct as somatic or physiological anxiety) exceeded moderate levels (Cottyn, De Clercq, Pannier, Grombez, & Lenoir, 2006).

Catastrophe theory was later reformulated in light of processing efficiency theory (see Chapter 11; Eysenck & Calvo, 1992). Physiological arousal was understood to be a reflection of compensatory effort to concentrate and stay on task. As tasks become increasingly difficult, combined with cognitive anxiety, competitors may conclude that no amount of effort will be sufficient to produce success. If they withdraw effort, performance will plummet, and they will only reinvest effort if they are relatively assured that they can compete successfully (Hardy, Beattie, & Woodman, 2007).

The question of the ideal level of physiological arousal and cognitive anxiety associated with optimal performance has not been conclusively determined, and may also depend on the nature of the task under evaluation (Eccles et al., 2011). For example, high levels of physiological arousal have been shown to cause sharp performance decrements in closed skill sports involving fine motor control, such as bowling, golf, and pistol shooting (Gould, Petlichkoff, Simons, & Vevera, 1987; Woodman,

Albinson, & Hardy, 1997). These activities involve closed or fixed skills in that successful performance is a result of executing skills in a prescribed and relatively invariant way. Activities that involve open or generative skills require flexibility in responding to changing conditions and the behavior of competitors.

In general, performance on tasks which require complex motor responses or a great deal of thought or information processing is best under conditions of lower physiological arousal (Billing, 1980; Landers & Arent, 2010; Oxendine, 1970; 1984). These complex tasks require sustained concentration, decision making, multiple cue discrimination, fine motor control, movement fluidity, and manual dexterity. Activities performed best at high levels of physiological arousal involve power, strength, endurance, and speed. For example, high levels of physiological arousal probably facilitate Olympic weight lifting. However, attempts to categorize athletic tasks have been criticized because different activities in the same sport require different levels of complex thought and motor control, and because some athletic tasks require simple skills and complex information processing or complex skills and limited information processing (Hardy et al., 1996).

Identifying Prime Intensity

Finding **prime intensity** requires the assessment of physiological and cognitive intensity as well as the recognition that levels of intensity associated with optimal performance were different for different people. A *person* might find *their* ideal level of intensity by keeping records of their physiological responses, thoughts, and emotions, and the social conditions prior to and during competitive tasks (Taylor, 1996; Taylor & Wilson, 2002). People committed to this record-keeping become systematic in understanding themselves and their tendencies associated with optimal performance. As sportspersons become more aware of their levels of intensity, they become more capable of controlling intensity levels (Robazza & Bortoli, 1998).

The physical symptoms of overintensity are most apparent. Symptoms include muscle tension, shaking muscles, breathing difficulty, and excessive perspiration. More subtle physical symptoms consist of "butterflies" or feelings of anxiety in the stomach, fatigue, and decreased motor coordination. Overintensity may be revealed by changes in behavior such as an increased pace or rushing during a performance, general agitation, and an increase in performance irrelevant, or "nervous," behaviors. Psychological signs of overintensity consist of negative self-talk, irrational thinking, problems with concentration, and the anticipation of poor results (Taylor, 1996; Taylor & Wilson, 2002). An example of negative self-talk is silent or audible criticism of one's performance or ability (e.g., "I'm the worst"). Irrational thinking might consist of all-or-nothing thinking (e.g., "If I can't hit a backhand, I might as well quit") or catastrophizing (e.g., "If I miss this penalty kick I'll go down in history as a choke artist").

Difficulties with overintensity are more common than problems with underintensity. The physical signs of underintensity are low levels of heart rate, respiration, adrenaline, and energy. The person may report feeling lethargic. Behavioral signs include reductions in pace and performance-relevant behaviors (e.g., routines), and increased distractibility. The psychological symptoms include apathy, loss of motivation to compete, and difficulty concentrating on tasks necessary for performance. The causes of underintensity have not been studied extensively. However, among the causes are overconfidence, or a belief that one's ability far exceeds the demands of the situation, and a lack of interest in competing (Taylor, 1996; Taylor & Wilson, 2002).

Optimal Pressure Model

The **optimal pressure model** (Costanzo, Woody, & Slater, 1992) incorporated concepts from the expectancy-value theory (Atkinson, 1978) described in Chapter 2 and the inverted-U theory (Yerkes & Dodson, 1908). However, this model emphasized situational sources of pressure rather than internal states of arousal or anxiety. Pressure was understood to derive from incentives for optimal performance. These incentives consisted of the intrinsic value of success compared to failure (the importance of the task), the situational consequences of success (social approval or disapproval), and the expectancy of success. High scores in all three of these areas were seen to contribute to pressure, and all three sources were understood to contribute essentially equal amounts of pressure. If attention is directed toward more than one source of pressure and if there are zero sources of pressure, performance suffers.

Doing one's best (at least by one's own estimate) when pressure is greatest may not be the norm. In a study of U.S. Olympic wrestlers at the 1988 Olympic Games, only 20% had their all-time best wrestling performance in Seoul (Gould, Eklund, & Jackson, 1992a). Thirty percent of the wrestlers indicated they had their worst Olympic performance in their most crucial Olympic match.

Anxiety Direction: Facilitative and Debilitative

Efficacy or confidence that one can achieve goals also has a significant influence on the **direction** of anxiety or how one interprets cognitive and physiological anxiety. People who believe that they exert control over the environment and themselves during evaluative tasks such as academic tests and athletic performances often interpret symptoms of anxiety as **facilitating** performance (Jones, 1995; Jones & Hanton, 2001; Hanton, Neil, & Mellalieu, 2008; Robazza et al., 2008; Williams, Cumming, & Balanos, 2010). For example, almost half of a sample of 91 competitive swimmers between the ages of 14 and 28 reported cognitive and physiological anxiety to be facilitative, and only 23% reported both kinds of anxiety as **debilitative** (Jones & Hanton, 1996). Sportspersons

at elite, collegiate, and high school levels who believe they will achieve their goals use anxiety as a cue to become more engaged in the task, and show additional persistence and better performance when experiencing anxiety that is interpreted as facilitative (Chamberlain & Hale, 2007; Hanton & Connaughton, 2002; Ntoumanis & Jones, 1998; Wiggins, 1998).

Collegiate athletes who viewed anxiety as facilitative viewed their precompetitive emotional states more positively than did their counterparts who considered anxiety to be debilitating (Mellalieu, Hanton, & Jones, 2003). Athletes with facilitative anxiety were more likely to also be excited, focused, motivated, and eager. Heightened levels of physiological and cognitive anxiety are also more likely to be interpreted as facilitative with sports that call for explosive action, such as rugby (Mellalieu, Hanton, & O'Brien, 2004; Hanton, Jones, & Mullen, 2000).

Elite athletes with facilitative anxiety use imagery, self-talk, and goal-setting skills to counteract memories of mistakes and failure. Elite female hockey players remembered poor plays, but corrected mistakes in their mental imagery. They counteracted doubts and worries with positive self-talk and rationalizations, such as interpreting anxiety to be a sign of excitement (Thomas, Hanton, & Maynard, 2007). Jones and Hanton (1996) reasoned that swimmers might have interpreted anxiety as facilitative because they had previously experienced success while anxious. Perhaps this successful experience helps to explain why only 16% of a group of elite cricket players (Jones & Swain, 1995) and 21% of highly advanced tennis players (Perry & Williams, 1998) considered signs of cognitive and physiological trait anxiety to be debilitating.

Success enables sportspersons to interpret signs of anxiety as facilitative. Success does not eradicate the experience of anxiety. For example, the cognitive and physiological anxiety levels experienced by elite and non-elite swimmers (Jones, Hanton, & Swain, 1994); national and club rugby union, soccer, and field hockey players (Hanton, Thomas, & Maynard, 2004); and gymnasts (Jones, Swain, & Hardy, 1993) were of similar intensities. The elite (Jones et al., 1994; Jones et al., 1993) and national-level athletes (Hanton et al., 2004) were more likely to interpret this anxiety as facilitative. Professional golfers and rugby players with more experience were also more likely to interpret anxiety as facilitative (McKay, Selig, Carlson, & Morris, 1996; Mellalieu et al., 2004).

Sportspersons with lower levels of trait anxiety are also more likely to interpret competitive anxiety as facilitative than those with higher levels of trait anxiety (Mullen et al., 2009). For example, state anxiety prior to tournaments was experienced as more facilitative and less intense among competitive golfers with lower levels of trait anxiety (Jones, Smith, & Holmes, 2004). Collegiate footballers or soccer players who experienced trait anxiety that disrupted concentration were more likely to report state anxiety, or anxiety within one hour of matches, to be debilitating (Hanton et al., 2002).

As discussed in Chapter 2, some types of goals are more likely than others to facilitate performance. Competitive swimmers did not exclusively identify outcome goals for meets (Jones & Hanton, 1996). With outcome goals, performance is measured in relation to competitors. An example of an outcome goal would be to finish first in a race. Outcome goals were considered to engender debilitating anxiety because the swimmer had no control over the performance of competitors. Most of the swimmers chose a combination of goals that included performance (complete a race under a certain time) and process (attention to the technical elements of the swim) goals (24%) or outcome, performance, and process goals (49%).

Even the biochemical substrates of anxiety are influenced by the manner in which preperformance anxiety is interpreted. The catecholamine, cortisol, and testosterone levels of elite male marathon canoeists were measured prior to races for selection to the world championships (Eubank, Collins, Lovell, Dorling, & Talbot, 1997). Catecholamine, cortisol, and testosterone levels were measured 24, 2, and 1 hours prior to the start of the races. Elevations in testosterone and catecholamines have been associated with adaptive responses to challenges, and elevated cortisol has been associated with the disruptive effects of stress. Testosterone levels climbed for canoeists who believed that anxiety prior to races facilitated performance and fell for canoeists that interpreted their anxiety before races as debilitating. Cortisol levels increased for the debilitatory and facilitatory groups one hour prior to races, but the levels were much lower for the facilitatory group. The catecholamines consisted of epinephrine, norepinephrine, and dopamine, and they increased sharply for the facilitatory group, and remained steady or moved lower for the debilitatory group. The catecholamines were understood to activate the body to deal with the challenge of competition.

Hanton and Jones (1999a) went on to study how elite male swimmers developed their capacity to interpret cognitive and physiological anxiety as facilitative. Early in their competitive careers, these swimmers experienced cognitive and physiological symptoms of anxiety to be debilitating. For example, some were preoccupied with worry and even vomited before races. They came to take the perspective that anxiety could facilitate performance as a result of mentoring by parents, coaches, and more experienced swimmers. They were mentored to accept anxiety as a natural and necessary reaction to competition and evaluation, and to view anxiety as an aid to optimal performance. These swimmers came to welcome anxiety prior to competition and to try to use it to boost performance and preperformance preparation.

Perhaps successful athletes also learn to moderate the intensity of their anxiety. Elite and sub-elite Swedish adolescent athletes in cross country and swimming were more likely to rate cognitive anxiety as facilitative when its intensity was low (Lundqvist, Kentta, & Raglin, 2011).

Novak Djokovic: "I want to be at one with nature."

The Botanical Gardens in Melbourne, Australia, are situated across the Yarra River from the Ron Laver Arena where the Australian Open is contested. Visitors to this almost inexpressibly beautiful public garden were surprised to find Novak Djokovic stretching, jogging, or simply meditating on mornings during the Australian Open. Djokovic reasoned that he could arrive at optimal psychological states in the lush and serene garden.

In ascending to the number one ranking in men's tennis, Djokovic learned to play "mentally lighter." In doing so, he plays with a calm serenity, knowing that he can impose his will on opponents and matches. He "adjusts the volume," or his level of arousal, during matches, and makes order out of the chaos of emotions, stress, and crowd reactions during matches.

Djokovic won his third consecutive Australian Open title in 2013. He defeated Andy Murray, 6-7 (2), 7-6 (3), 6-3, 6-2 (Wertheim, 2013).

Coaches and mentors facilitate this process of learning from experience when they help athletes to reflect upon states of anxiety and results of competition. In this process, athletes not only learn to interpret anxiety as facilitative, but also focus on successful skill execution regardless of anxiety states. This knowledge is recalled in preparation for future competition (Hanton, Cropley, & Lee, 2009).

Not all elite athletes receive the benefits of nurturing relationships with coaches, mentors, and other athletes. These athletes may require focused consultations from sport psychologists to alleviate debilitating anxiety (Hanton, Thomas, & Mellalieu, 2009). This was in evidence in a group of female hockey players in the English Hockey League National Premier League. They responded favorably to training in self-talk, mental imagery, rationalization and restructuring, and goal setting. Their experience of facilitative anxiety and self-confidence increased, and their play in matches improved (Thomas, Maynard, & Hanton, 2007).

Facilitative and Debilitative Anxiety and Coping

Anxiety has been described as facilitative or debilitative, depending on its effects on behavior. Those with **facilitative anxiety** may also cope more effectively with stressors. For example, college students with facilitative anxiety about impending exams studied more effectively and scored better marks (Rafferty, Smith, & Ptacek, 1997). They engaged in problem-focused coping, as they began studying well in advance, and sought help from others when help was needed. Collegiate students with debilitative test anxiety were more likely to show avoidant coping, or methods of distracting themselves from the stressor of the test and their anxiety. Students with **debilitative anxiety** were also beset with more cognitive anxiety and worries that distracted them from effective study. Students

with debilitating and facilitative anxiety experienced physiological anxiety or "butterflies" in their stomachs prior to exams. However, those with facilitative anxiety "shook" these butterflies during exams, whereas students with debilitating anxiety did not. With facilitative anxiety, students were also not beset by cognitive anxiety or worry.

Anxiety, Intensity, or Arousal Levels and Performance

The question of the ideal level of physiological and cognitive anxiety associated with optimal performance has not been conclusively determined, and may be dependent not only on the differences between people, but on the nature of the task under evaluation. For example, high levels of somatic anxiety have been shown to cause performance decrements on complex tasks that require sustained concentration, decision making, multiple cue discrimination, fine motor control, movement fluidity, and manual dexterity. Clearly there are differences in the manner in which people interpret the signs of anxiety, and athletes may learn to interpret signs of anxiety as facilitative. However, not everyone interprets signs of anxiety as facilitative, especially when one doubts their efficacy to perform successfully (Lundqvist et al., 2011; Bandura, 1997). Even some children and adolescents base judgments about their competence in sports on pregame anxiety. Higher levels of anxiety in these children and adolescents were associated with lower estimates of their sports competence (Weiss, Ebbeck, & Horn, 1997). Finally, the question of when anxiety is experienced is important. The experience of anxiety before evaluations and competitions may facilitate performance if it motivates coping strategies that better prepare a person for the evaluation. However, better results have been associated with decreased anxiety prior to and during evaluations (Giacobbi & Weinberg, 2000) or with the ability to sustain concentration and task-absorption during competitions or evaluations despite some measure of anxiety.

SUMMARY AND APPLICATION

A considerable amount of research has been devoted to the relationship between arousal, intensity, or anxiety levels and performance. Attempts to find universal levels of arousal and anxiety that are most facilitative of performance have not been successful. This appears to be a result of the differences between people in terms of the levels of arousal or intensity that facilitate their best performances. Also, different levels of anxiety and arousal facilitate better performance on different tasks. High levels of physiological anxiety and arousal appear to be more disruptive to performance on tasks which require sustained concentration, complex motor responses, or a great deal of thought or information processing. Higher levels of anxiety may also be more facilitative during preparations for performances versus the actual performance. Preperformance anxiety

is adaptive to the degree that it motivates the appropriate preparation for the performance or evaluation.

Recent research has emphasized the cognitive and physiological components of anxiety. Heightened physiological anxiety need not disrupt performance so long as a performer interprets it as a factor to facilitate performance. However, not all people are equally intrepid, and the self-efficacy of some people is diminished by the experience of their physiological anxiety. Techniques for gaining control over these physiological responses will be discussed in Chapter 7. These techniques are useful not only for controlling physiological responses proximate to evaluations and competitions, but also for enhancing well-being.

Key Terms

Cognitive-relational theory of stress 82

Coping 83

Problem-focused coping 83

Emotion-focused coping 83

Interpersonal coping 83

Avoidance-focused coping 84

Appraisal-focused coping 84

Insight 86

Arousal 86

Intensity 86

Cognitive and physiological anxiety 86

State anxiety 87

Inverted-U hypothesis 87

Individualized Zone of Optimal Functioning (IZOF) 89

Catastrophe theory 91

Prime intensity 92

Optimal pressure model 93

Anxiety Direction: Facilitative and debilitating anxiety 93

Discussion Questions

- Q1. Explain the cognitive-relational theory of stress.
- Q2. What are the four ways that stressors may be appraised or interpreted?
- Q3. Review forms of coping: Problem-focused, emotion-focused, interpersonal, avoidance-focused, and appraisal-focused.
- Q4. How is insight related to the deployment of mental skills and copying?
- Q5. Differentiate anxiety, arousal, and intensity.
- Q6. Describe cognitive and physiological anxiety.
- Q7. Differentiate state and trait anxiety.
- Q8. What is the relationship between arousal and performance according to the inverted-U hypothesis?
- Q9. What tasks are performed better at moderate and lower levels of arousal?
- Q10. What tasks benefit from increased arousal?

- Q11. How does an individual determine the Individualized Zone of Optimal Functioning (IZOF) for optimal performance?
- Q12. Explain the impact of hedonic tone and functional impact of emotions on performance.
- Q13. Differentiate catastrophe theory from the inverted-U theory and IZOF.
- Q14. How does one determine prime intensity for performance?
- Q15. Review of optimal pressure model.
- Q16. Differentiate facilitative and debilitating anxiety.
- Q17. How is facilitative anxiety related to imagery, self-talk, and goal setting?
- Q18. How is facilitative anxiety developed?
- Q19. Is coping related to facilitative and debilitating anxiety?

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