Chapter 1
Overview of Behavioral Sport Psychology

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The term *behavior analysis* refers to the scientific study of laws that govern the behavior of human beings and other animals (Pear, 2001). *Behavioral sport psychology* involves the use of behavior analysis principles and techniques to enhance the performance and satisfaction of athletes and others associated with sports (Martin & Tkachuk, 2000). In this chapter, we trace the early development of the field, highlight five characteristics that tend to be evident in research and current practice in behavioral sport psychology, and summarize nine major areas of application in this field to date.

The Early Development of Behavioral Sport Psychology

The field of sport psychology in general began to acquire status in the 1960s with the formation of the *International Society of Sport Psychology* in 1965, *The North American Society for the Psychology of Sport and Physical Activity* in 1967, and *The Canadian Society for Psychomotor Learning and Sport Psychology* in 1969. A prominent behaviorally oriented individual in this early history was Brent Rushall. In 1969, Rushall and Pettinger published a comparison of several different reinforcement contingencies on the amount of swimming performed by members of an age-group swimming team. In 1972, Rushall teamed up with physical educator Daryl Siedentop to publish *The Developmental and Control of Behavior in Sport and Physical Education.* This book was written within an operant conditioning framework, and it contained numerous practical strategies for teaching new sport skills, motivating sports persons to practice existing skills at a high level, and generalizing practice skills to competitive settings. In 1974, Thom McKenzie and Rushall published the first research in the *Journal of Applied Behavior Analysis* that took place in a sport setting, and it was the first study in behavioral sport psychology to use a single-subject design. Their research demonstrated the effectiveness of a self-monitoring package for improving practice performance of young competitive swimmers. Two other prominent individuals in behavioral sport psychology in the

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1970s were Ron Smith and Frank Smoll at the University of Washington, where they conducted behavioral assessments and interventions in youth sports (for a review, see Smith, Smoll, & Christensen, 1996). Rushall, Siedentop, McKenzie, Smith, and Smoll were the early leaders for behaviorally oriented sport psychologists.

During the late 1970s and the early 1980s, publications in behavioral sport psychology included the following: (a) single-subject evaluations of strategies to improve performance of youth athletes in football, gymnastics, tennis, swimming, soccer, and figure skating, and college athletes in volleyball, baseball, basketball, and soccer (for a review of these studies, see Martin, Thompson, & Regehr, 2004); (b) an insightful book that offered a Skinnerian analysis of the contingencies that deter and promote participation in sports (Dickinson, 1977); (c) articles that described and examined behavioral strategies for coaches of young athletes (e.g., see Martin & Hrycaiko, 1983; Rushall & Smith, 1979; Smith, Smoll, & Curtis, 1979; Smoll, Smith, & Curtis, 1978); and (d) research on cognitive–behavioral strategies for improving athletic performance of adult athletes (e.g., Desiderato & Miller, 1979; Gravel, Lemieux, & Ladouceur, 1980; Kirchenbaum, Ordman, Tomarken, & Holtzbauer, 1982; and Weinberg, Seabourne, & Jackson, 1981). Many of the early studies were contained in a book of readings by Martin and Hrycaiko (1983). By the mid-1980s, behavioral sport psychology had a strong foundation and a promising future.

Prominent Characteristics of Behavioral Sport Psychology

Preliminary to a discussion of the characteristics of behavioral sport psychology is a clarification of the meaning of the terms *behavior* and *stimulus.* In general, behavior is anything that a person says or does. Technically, behavior is any muscular, glandular, or electrical activity of an organism (Martin & Pear, 2011). Commonly used synonyms for behavior include "response," "action," "reaction," "performance," and "activity." *Overt behaviors* can be easily monitored by others, and examples are swimming, throwing a basketball, doing a spin in figure skating, yelling at a teammate, and arguing with a coach. *Covert behaviors* refer to activities that are internal and cannot be readily monitored by observers. Examples include a gymnast thinking, "I hope I don't fall"; a figure skater feeling nervous (e.g., increased heart rate, and rapid breathing) just before performing; and a diver mentally rehearsing a dive just before performing it. (Thinking and feeling are discussed later.) Stimuli (plural of stimulus) are the physical variables in one's immediate surroundings that impinge on one's sense receptors and that can affect one's behavior (Martin & Pear, 2011). Examples of external stimuli include the behavior and physical appearance of the coach and other athletes in the immediate vicinity, the characteristics of the playing field or facility, and the actions and sounds of spectators. One's private behavior, such as an athlete's feelings, self-talk, and imagery (discussed later in this chapter and in Chapter 8), can also serve as internal stimuli to influence subsequent behavior. When a stimulus precedes and influences a behavior, the stimulus is often called a "prompt," "signal," or "cue."

The first characteristic of behavioral sport psychology involves identifying target behaviors of athletes and/or coaches to be improved, defining those behaviors in a way so that they can be reliably measured, and using changes in the behavioral measure as the best indicator of the extent to which the recipient of an intervention is being helped (Martin, 2011). This characteristic is discussed further in Chapters 2, 3, and 5.

A second characteristic is that behavioral psychology treatment procedures and techniques are based on the principles and procedures of Pavlovian (or respondent) and operant conditioning and are ways of rearranging the stimuli that occur as antecedents and consequences of an athlete's behavior. Pavlovian conditioning is very important in influencing the physiological components of our emotions that we describe as our feelings.

Suppose, for example, that a young figure skater experiences several bad falls while attempting to learn the triple-toe jump, with each fall causing feelings of fear and considerable pain. The principle of Pavlovian conditioning states that if a neutral stimulus (practicing the triple-toe jump) is closely followed by an unconditioned stimulus (a bad fall), which elicits an unconditioned response (feelings of fear), then the previously neutral stimulus (practicing the triple-toe jump) will also tend to elicit that response (feelings of fear). The model for Pavlovian conditioning is shown in the top half of Fig. 1.1. Fortunately, a conditioned reflex (a CS–CR sequence), as illustrated in Fig. 1.1, can be eliminated through the process known as Pavlovian extinction. As illustrated in the bottom half of Fig. 1.1, the Pavlovian extinction procedure is the presentation of the CS without further pairings with the US, and the result is that the CS eventually loses the ability to elicit the CR. Pavlovian procedures for influencing desirable emotional reactions (e.g., calmness and relaxation) and for eliminating undesirable emotional reactions (e.g., fear and anxiety) are important intervention strategies in behavioral sport psychology (Martin, 2011).

Pavlovian conditioning is all about learned and unlearned reflexes – involuntary responses to prior stimuli. However, much of our behavior is referred to as voluntary. Examples of voluntary behavior among athletes include passing a basketball, performing a figure skating jump, swimming the backstroke, listening to a coach, and talking to a teammate. Skinner (1953) referred to such activities as operant behavior – behavior that operates on the environment to produce consequences, and, in turn, is influenced by those consequences. While Pavlovian conditioning causes individuals to involuntarily respond to stimuli due to pairings of antecedent stimuli before the response, operant conditioning teaches individuals to emit voluntary behavior to antecedent stimuli due to consequences for those behaviors. A simplified sport example is illustrated in Fig. 1.2. Suppose that a golfer is practicing putts of approximately 6–8 feet in length. At some places on the practice putting green, the surface around the hole is flat. At another place on the putting green, the surface around the hole is sloped. In the presence of the cues provided by a flat green, the golfer's behavior of aiming and hitting the ball directly at the hole will be positively reinforced by making the putt. In the presence of the cues when there is a slope on the green, however, the golfer's behavior of aiming and hitting the putt directly at

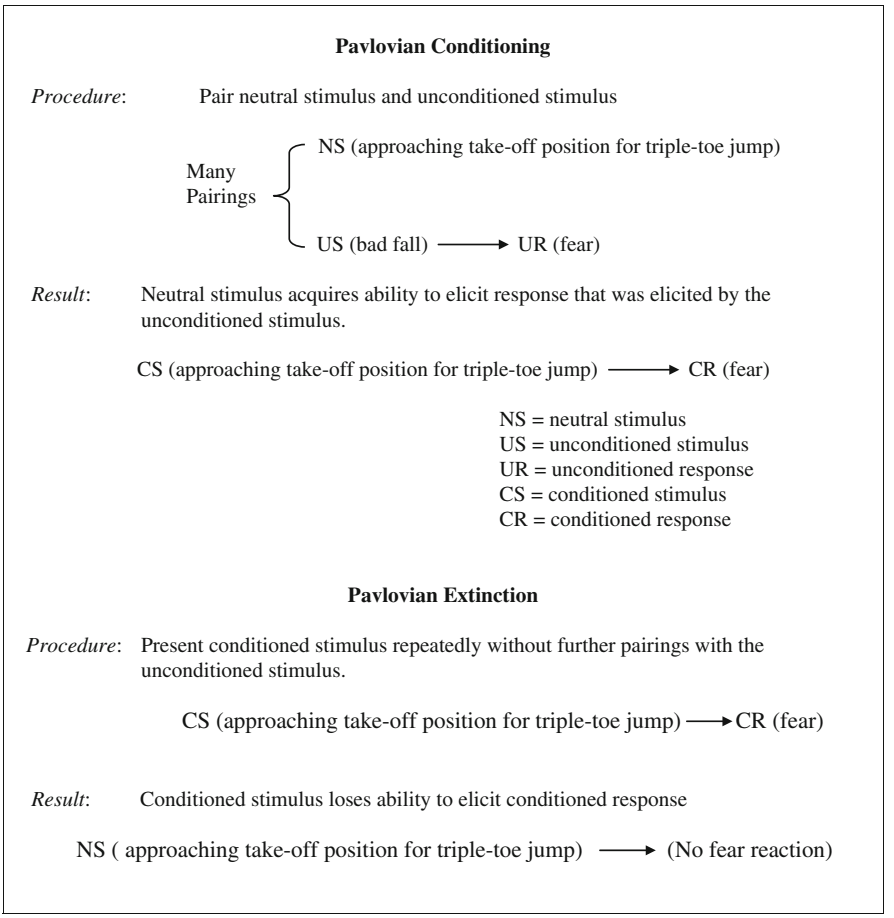

Fig. 1.1 An illustration of Pavlovian conditioning of fear while a figure skater is practicing a jump, and an illustration of Pavlovian extinction of that fear (adapted with permission from illustrations in Martin, 2011)

the hole will encounter operant extinction in that the behavior will not be reinforced by making the putt. As illustrated in Fig. 1.2, after several trials, the golfer learns to putt directly at the hole only when putting at a flat green.

Operant conditioning principles and procedures include methods for teaching new skills (e.g., shaping and chaining), strategies for maintaining existing skills and behaviors at desired levels (e.g., intermittent reinforcement), procedures for bringing new skills under the control of appropriate cues (e.g., stimulus discrimination training, modeling, and fading), and strategies for decreasing unwanted behaviors (e.g., operant extinction, response-cost punishment, and reinforcement of desirable alternative behavior).

Pavlovian and operant conditioning procedures are summarized with many sport examples in a single chapter in a book by Martin (2011) and are described in

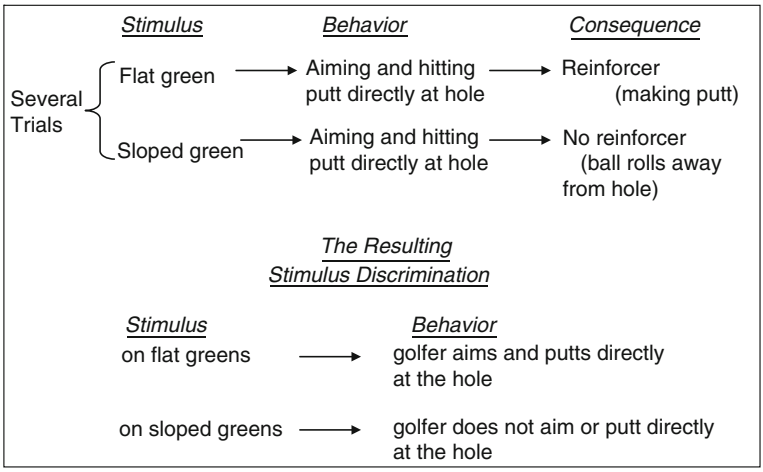

Fig. 1.2 An illustration of stimulus discrimination training involving operant behavior of a golfer (adapted with permission from an illustration in Martin, 2011)

considerable detail in many chapters by Martin and Pear (2011). This second characteristic is discussed further in Chapters 3, 6, 7, 9, and 10.

A third characteristic of behavioral sport psychology is that many of the interventions with athletes have been developed by practitioners with a cognitive–behavioral orientation (e.g., see Smoll & Smith, 2010; Zinsser, Bunker, & Williams, 2006). Cognitive–behavior therapy typically focuses on cognitive processes frequently referred to as *believing, thinking, expecting, and perceiving.* Over the years, cognitively oriented sport psychologists have provided considerable evidence that inappropriate thinking by athletes can lead to poor performance and that appropriate or positive thinking can lead to good performance (Zinsser et al., 2006). From an applied behavior analysis (ABA) perspective, cognitive processes are referred to as covert verbalizations and/or imagery (both of which are discussed later in this chapter), and it is assumed that the behavioral principles and techniques that apply to overt behaviors are also applicable to covert behaviors (Martin & Pear, 2011). Cognitive–behavioral interventions in sports are discussed further in Chapters 5, 8, and 15.

A fourth characteristic of this approach is that researchers have relied heavily on the use of single-subject research designs. As expressed by Hrycaiko and Martin (1996) and Virués-Ortega and Martin (2010), single-subject designs have a number of features that render them "user-friendly" for practitioners to evaluate interventions in sport settings, including the following: (a) a focus on individual athletic performance across several practices and/or competitions; (b) acceptability by athletes and coaches because no control group is needed, few participants are needed, and sooner or later all participants receive the intervention; (c) easy adaptability to assess a variety of interventions in practices and/or competitions; and (d) effectiveness assessed through direct measures of sport-specific behaviors (e.g., jumps landed by figure skaters) or outcomes of behaviors (e.g., points scored by basketball

players). For a review of research using single-subject designs in sport psychology, from the initial study by McKenzie and Rushall in 1974 through the next 30 years, see Martin et al. (2004). Single-subject designs are discussed further in Chapter 4.

A final characteristic of a behavioral approach, whether with athletes and coaches or with other populations, is that it places high value on accountability for everyone involved in the design, implementation, and evaluation of an intervention (Martin & Pear, 2011). In ABA, the term *social validation* refers to procedures to ensure that the techniques employed by a practitioner are selected and applied in the best interests of the clients. In behavioral sport psychology, social validation requires that the practitioner constantly seek answers to three questions: (a) What do the athletes (and perhaps the coach and parents) think about the goals of the intervention? (b) What do they think about the procedures recommended by the practitioner? (c) What do they think about the results produced by those procedures? Also, behavioral sport psychologists need to be aware of and behave consistently with the set of ethical principles to guide the actions of sport psychologists published in 1995 by the Association for the Advancement of Applied Sport Psychology, which, in 2006, became the Association for Applied Sport Psychology (AASP). (For the ethical principles of AASP, see the website http://appliedsportpsych.org.) Additional discussion of topics relevant to this characteristic can be found in Chapters 11, 12, 13, 14, and 15.

Major Areas of Application of Behavioral Sport Psychology

Motivating Practice and Fitness Training

Webster's unabridged dictionary defines motive as "some inner drive that causes a person to act in a certain way," and many people conceptualize motivation as some "thing" within us that affects behavior. A behavioral approach, on the other hand, encourages the use of the verb "to motivate" which has the advantage of providing coaches and athletes with a variety of strategies for motivating practice performance and endurance and fitness activities. Martin (2011) described the details of a behavioral approach to the topic of motivation and athletic performance, and summarized a variety of strategies for arranging antecedents and/or consequences to motivate athletic behavior in a variety of settings. For example, consider the problem of motivating speed skaters to work hard in practices. Members of the Manitoba Provincial Speed Skating Team, ranging in age from 12 to 17 years, were preparing for the Canada Winter Games. Three of the skaters, however, showed considerable off-task behavior and completed only 85% of the skating drills assigned by the coach. With the help of Connie Wanlin, a master's student at the University of Manitoba, the three skaters agreed to participate in a project to improve their motivation. The skaters agreed to set weekly written goals and daily goals for number of laps skated and practice drills completed, to record their daily performance in log books, and to meet with Connie once a week to discuss their progress and receive feedback. During the intervention, which lasted for several weeks, the three

skaters showed an average of 73% increase in the number of laps skated per practice, and they completed an average of 98% of the drills assigned by the coach. Racing times obtained in practices and competitions improved for all three skaters (Wanlin, Hrycaiko, Martin, & Mahon, 1997). Additional examples in this area include motivating young competitive swimmers (Critchfield & Vargas, 1991), adult novice rowers (Scott, Scott, Bedic, & Dowd, 1999), and adult recreational athletes performing a gymnasium triathlon (Thelwell & Greenlees, 2003). Detailed discussion of motivational procedures is presented in Chapters 6, 7, 9, and 10.

Teaching New Sport Skills

During the past 50 years, behavioral researchers have investigated a variety of behavioral principles and techniques for helping individuals in all walks of life to learn new skills, develop persistence, and eliminate bad habits. As described by Martin and Pear (2011), thousands of research reports have demonstrated the value of these principles and techniques for improving a wide variety of behaviors of thousands of individuals in diverse settings. It should not be surprising, then, that an important area of application of behavioral sport psychology is teaching new skills to athletes and/or coaches. In a review of 30 years of research using single-subject designs in sport psychology, 72% of the studies focused on improving athletic skills of athletes in a variety of sports (Martin et al., 2004). Examples include improving free throw shooting form in basketball (Kladopoulos & McComas, 2001), improving the correctness of compulsory figures in figure skating (Ming & Martin, 1996), improving offensive blocking in youth football (Allison & Ayllon, 1980), increasing arm extension in pole vaulting (Scott & Scott, 1997), teaching golf to beginners (Simek & O'Brien, 1981), improving positioning and tackling of linebackers in college football (Ward & Carnes, 2002), increasing correct tags of inline roller speed skaters (Anderson & Kirkpatrick, 2002), and improving freestyle and backstroke turns in youth swimming (Hazen, Johnstone, Martin, & Skrikameswaran, 1990).

For some details of an example, consider the problem of teaching novice tennis players to serve. In the Juniper High School tennis class, Linda Hill had devoted three classes in a row to instruction on how to serve. After each class, each player was given the chance to practice while Coach Hill observed and pointed out errors. With this strategy, the novice players showed little improvement and averaged only 13% correct across service attempts. With the help of Hillary Buzas, a doctoral candidate in clinical psychology at Georgia State University, Coach Hill agreed to try a different strategy. First, the specific components of the serve were listed and discussed with the players. Next, when the players practiced, Coach Hill watched for and praised components (from the checklist) that were performed correctly or near correctly. When an error occurred, the coach did not comment on it in any way. This approach, which involved the behavioral procedure of shaping, produced an improvement from 13% during baseline observations to almost 50% correct performance in only a few sessions. Moreover, the young players enjoyed it more and

were eager to practice their skills (Buzas & Ayllon, 1981). For further discussion of behavioral procedures for teaching new skills, see Chapters 6, 7, and 11.

Decreasing Persistent Errors in Sport Skills

Even after considerable practice, many young athletes will continue to make errors in the execution of athletic skills. As described by Martin (2011), there are numerous reasons why errors are repeated. Persistent errors in skills made by beginning athletes might be due to imitation of other young athletes who are making the same errors; lack of focus on the appropriate antecedent cues, as a strategy to obtain attention from the coach; lack of reinforcement for correct performance especially when the correct performance requires a lot of effort; and accidental positive reinforcement of an error when the young athlete is successful in spite of the error. Regarding the last point, when a skill results in early success for a young athlete, all of the components of that skill are strengthened, even if one of the components is flawed. For example, in a youth competitive swim team composed of 9- and 10-year-olds, if the swimmers swim 500 m of freestyle during a practice (a common occurrence), an error in their freestyle stroke will be repeated several hundred times per practice. Thus, it is not surprising that certain errors are difficult to decrease. Sandra Koop, a doctoral student in psychology at the University of Manitoba, was contacted by a coach of the Manitoba Marlins, a youth competitive swim club, to help decrease repetitive errors in some of the young swimmers. The errors had persisted for several weeks in spite of the usual coaching techniques. Sandra developed an intervention package that consisted of identification of errors and correct behaviors, awareness training regarding the errors and correct behaviors, instruction with key words, mastery criteria, and immediate feedback, and demonstrated the effectiveness of the package in a multiple-baseline design across participants and swimming strokes (Koop & Martin, 1983). Other examples of strategies for decreasing errors have been reported for play execution of the offensive backfield of a youth football team (Komaki & Barnett, 1977), performance of gymnastic skills with young gymnasts (Allison & Ayllon, 1980), execution of throw-ins and goal kicks in youth soccer (Rush & Ayllon, 1984), and performance of volleyball skills by college players (Landin & Hebert, 1999; McKenzie & Liskevych, 1983).

Decreasing Problem Behaviors of Athletes in Sport Environments

Sport psychology consultants are sometimes asked for their advice to help coaches decrease problem behaviors exhibited by athletes. By problem behaviors we mean a variety of disruptive, non-athletic activities that are likely to interfere with athletic performance and/or create aversiveness for others, such as excessive socializing during athletic drills, temper tantrums, annoying and disruptive behaviors while the coach is talking to the team, and so forth. Examples of strategies to decrease problem

behaviors include monitoring and the public posting of such behaviors (Galvan & Ward, 1998), using self-monitoring and charting to increase desirable alternative practice behaviors (Hume, Martin, Gonzalez, Cracklen, & Genthon, 1985), using group music reinforcement for desirable alternative behaviors (Hume & Crossman, 1992), and awareness training, competing response training, and arranging supporting contingencies (Allen, 1998).

Managing Emotions to Maximize Athletic Performance

Martin and Pear (2011) suggested that emotions have three important characteristics: (a) the internal autonomic reaction that one feels during the experiencing of an emotion (such as the nervous sensations that an athlete feels just before the start of an important competition), which is influenced by respondent conditioning; (b) the way that one learns to express an emotion overtly (such as swearing and throwing things when angry), which is influenced by operant conditioning; and (c) the way that one becomes aware of and describes one's emotions (e.g., "I'm a little excited," as opposed to "I'm really nervous"), which is also influenced by operant conditioning. With this analysis in mind, two areas that have received attention from behavioral sport psychologists are as follows: (a) teaching athletes strategies to decrease excessive nervousness or fear that negatively affects athletic performance and (b) teaching athletes strategies to overcome excessive anger and aggression. A related area of research has examined the relationship between physiological arousal and athletic performance. We will briefly comment on all three of these areas.

Excessive nervousness or anxiety or fear is often identified by coaches and athletes to account for poor athletic performance. Goldberg (1998) suggested that "fear is probably the single biggest cause of choking in sports." Using the model of emotions summarized previously, Martin (2011) outlined four main reasons why excessive feelings of nervousness or fear can interfere with athletic performance. First, the physiological activity from excessive nervousness consumes energy, which can be problematic in endurance athletic activities. Second, because of our evolutionary history, experiencing nervousness can cause a narrowing of attention, so that fearful athletes may miss important external cues. Third, excessive nervousness causes the secretion of adrenaline, which can cause an athlete to rush a skilled routine and destroy the timing of it. Finally, if an athlete is relatively relaxed at practices and very nervous at a competition, the excessive nervousness adds additional stimuli that may interfere with stimulus generalization of a skill from practices to competitions. Strategies that have been applied by behavioral sport psychologists to help athletes cope with excessive nervousness or fear include teaching athletes to (a) recognize and change negative thinking that might cause the fear or nervousness, (b) restructure the environment to "tune out" and prompt relaxing thoughts, (c) practice a relaxing breathing technique called deep center breathing, (d) practice progressive muscle relaxation by alternatively tensing and relaxing various muscle groups and paying close attention to how the muscles feel when they are relaxed

versus tense, (e) maintain a sense of humor, and (i) visualize relaxing scenes [these strategies are described in detail by Martin (2011) and Williams (2010)].

In the model of emotions described by Martin and Pear (2011), anger is caused by the withdrawal or the withholding of rewards such as a missed shot by a basketball player, a disallowed goal for a soccer player, or a penalty in football that wipes out a yardage gain. Several studies have described successful anger management procedures for athletes (Allen, 1998; Brunelle, Janelle, & Tennant, 1999; Connelly, 1988; Jones, 1993; Silva, 1982). Such studies commonly follow a four-step strategy including (a) helping the athlete to identify anger-causing situations, (b) teaching the athlete to perform substitute behaviors to compete with the anger, (c) prompting the athlete to practice the substitute behaviors using imagery and/or simulations and/or role-playing, and (d) encouraging the athlete to use the coping skills in competitive situations and to receive feedback. For further discussion of aggression in competitive sports, see Chapter 13.

Regarding the relationship between physiological arousal and athletic performance, many studies have suggested an inverted-U relationship between arousal and performance (Landers & Arent, 2010). To illustrate this relationship, consider the level of arousal as varying on a continuum from very low to medium to very high. When the level of physiological arousal is low, athletic performance is likely to be poor, and the athlete is likely to be described as being indifferent, disinterested, not being able to "get into the game," lacking intensity, etc. As the level of physiological arousal increases to some medium level, athletic performance is likely to increase to a peak, and the athlete is likely to be described as having lots of energy, having great anticipation, and being on top of his/her game. As the level of arousal continues to increase to a high level, athletic performance is likely to decrease, and the athlete is likely to be described as being excessively nervous, tense, or fearful and will show a high tendency to "choke." For discussion of strategies to help athletes achieve an optimal level of arousal, see Landers and Arent (2010) and Williams (2010).

Using Self-Talk and/or Imagery Training to Improve Athletic Performance

As indicated previously, applied behavior analysts consider private behavior to include saying things to oneself (i.e., self-talk) and imagining (e.g., visualizing a clear blue sky), and assume that behavioral principles and procedures apply to private as well public behavior. Regarding self-talk, research has indicated that athletes can use self-talk to improve performance in a variety of areas, including controlling their emotions and/or mood, stopping negative thoughts, improving their focusing or concentration skills, problem solving or planning, and improving skill acquisition and performance (Zinsser et al., 2006). To take just one example, Ziegler (1987) reported that beginning tennis players practicing backhand shots showed little progress when simply told to "concentrate." However, they showed rapid improvement when they vocalized the word "ready" when the ball machine was

about to present the next ball, the word "ball" when they saw the ball coming toward them from the machine, the word "bounce" as the ball contacted the surface of the court, and the word "hit" when they observed the ball contact their racquet while swinging their backhand.

From a behavioral perspective, Martin (2011) suggested that self-talk might serve four behavioral functions. First, self-talk can serve as a conditioned stimulus (due to prior respondent conditioning) to elicit various emotions, such as the gymnast who thinks "balance, graceful" just before stepping on the balance beam to elicit feelings of relaxation. Second, self-talk might function as a cue for attending or focusing on certain stimuli (such as a batter in baseball saying, "watch the ball," when the ball leaves the pitcher's hand). Third, in terms of operant conditioning, specific words commonly called *key words* in sports might serve as discriminative stimuli to prompt particular body positions for motor skills (such as a swimmer thinking "hips" during the backstroke as a prompt to keep his/her hips high in the water and as flat as possible). Fourth, self-talk can function as a conditioned reinforcer for desirable actions (such as a weight lifter thinking, "Good work, keep it up," after completing 10 repetitions of a particular weight exercise). For further discussion of self-talk to improve athletic performance, see Chapters 8 and 15.

Regarding imagery, cognitive–behavioral psychologists have made considerable use of imagery training to improve the performance of athletes (Vealey & Greenleaf, 2010). From a behavioral perspective, we learn to experience visual imagery through a process referred to by Skinner (1953) as "conditioned seeing," in other words, through respondent conditioning. For example, as we grew up, we experienced many trials in which the words "blue sky" were paired with actually looking at and seeing a blue sky. As a result, when we now close our eyes and imagine a blue sky, the activity elicited in our visual system enables us to experience the behavior of "seeing" a blue sky. Two behavioral psychologists, Malott and Whaley (1983), talked more generally about instances of conditioned sensing. Our long history of associating words with actual sights, sounds, and feelings enable us to experience inside activity when we imagine seeing, feeling, or hearing something. In sport psychology, the process of imagining and seeing oneself performing an activity is referred to as *mental rehearsal* or *mental practice.* In a survey of 235 Canadian Olympic athletes, 99% claimed to use mental rehearsal to enhance their performance (Orlick & Partington, 1988), and many studies have shown that various imagery training procedures can enhance athletic performance (Vealey & Greenleaf, 2010).

Strategies to use mental imagery to enhance practice performance include the following: (a) scheduling separate imagery sessions to imagine performing a skill (such as imagery practice to improve a basketball player's free throw shooting); (b) using imagery to energize before practices (for example, an athlete imagining that an important competition is about to start); (c) using imagery at practices before performing a previously learned skill in order to increase the likelihood of performing it correctly (such as a figure skater mentally rehearsing a jump at practices just before attempting it); (d) practicing instant mental replays following a correctly performed skill to help remember the feelings of performing it correctly; and (e) using

visualization to simulate the competitive environment to promote stimulus generalization from practices to competitions [these strategies are discussed in detail by Martin (2011) and Zinsser et al. (2006)]. Strategies to use mental imagery to enhance competitive performance include the following: (a) use of imagery for emotional control just before and during competitions (such as an athlete who is excessively nervous athlete imagining that he/she is relaxing at the beach on a warm summer day); (b) mental rehearsal of a skill just before performing it such as reported by Jack Nicklaus before each of his shots when he was an active competitive golfer (Nicklaus, 1974); and (c) use of imagery to help tune out distracters [details of these strategies are described by Martin (2011) and Zinsser et al. (2006)]. For further discussion of imagery training to improve athletic performance, see Chapters 8 and 15.

Maximizing Confidence and Concentration for Peak Performance During Competitions

Questionnaire studies with athletes have reported that the factor that most consistently distinguishes highly successful athletes from less successful ones is "confidence" (Weinberg & Gould, 2007; Zinsser et al., 2006). The ability to concentrate effectively has also been identified as a key ingredient of peak athletic performance (Nideffer & Sagal, 2006). The term *peak performance* is used to refer to an outstanding athletic performance, when an athlete "puts it all together" (Krane & Williams, 2010). How do behavioral psychologists talk about confidence and concentration? From a behavioral perspective, *confidence* is a term that is used to describe athletes who have performed well in recent practices and/or competitions and who show certain behavior patterns that would be described collectively as illustrating the belief that they will perform well in an upcoming competition (Martin, 2011). A behavioral interpretation of the term *concentration* suggests that two behavioral processes are involved (Martin, 2011). First, concentration includes behavior commonly referred to as observational, orienting, attending, or focusing – behavior that puts the individual in contact with important cues for further responding. For example, a batter in baseball who is "concentrating" is likely to focus on the pitcher, rather than attending to the first baseman. Second, following appropriate attending or focusing behavior, concentration refers to the extent to which particular cues exert effective stimulus control over skilled performance. For example, after a batter has focused on the pitcher, if the sight of the baseball approaching the strike zone exerts stimulus control over a solid swing and a hit by the batter, we would say that the batter has shown good concentration.

Strategies to improve confidence, concentration, and peak performance include teaching athletes to orient to proper cues (Nideffer & Sagal, 2006; Wilson, Peper, & Schmid, 2006), influencing athletes to perform well in simulations of competitive cues (Weinberg & Gould, 2007), using imagery to relive best performances (Orlick & Partington, 1988), encouraging athletes to focus on realistic goals for execution rather than worrying about outcome (Swain & Jones, 1995; Ward & Carnes,

2002), using facts and reasons to build a case against negative thinking (called countering; Bell, 1983), and encouraging athletes to prepare and follow specific competition plans (Rushall, 1979, 1992). For additional discussion on the topics of this subsection, see Chapters 5, 8, 11, and 15.

Development of User-Friendly Behavioral Assessment Tools for Athletes

Behavioral assessment has been defined as the collection and analysis of information and data in order to identify and describe target behaviors, identify possible causes of the behavior, guide the selection of an appropriate behavioral treatment, and evaluate treatment outcome (Martin & Pear, 2011). Behavioral assessment began to emerge in clinical psychology in the 1970s in response to criticisms by behaviorally oriented practitioners against traditional diagnostic assumptions and approaches (Nelson & Hayes, 1979; Nelson, 1983). Behavioral assessment in sport psychology typically begins with a behavioral interview to help the athlete identify major problem areas, select one or two such areas for initial treatment, identify specific behavioral deficits or excesses within the targeted problem areas, attempt to identify controlling variables of the problem behavior, and identify some specific target behaviors for initial treatment (Orlick, 1989; Smith et al., 1996; Tkachuk, Leslie-Toogood, & Martin, 2003). User-friendly behavioral checklists for athletes have been developed to facilitate this process. One type of checklist is an *across-sport behavioral checklist*, which lists performance aspects of practices and/or competitions that apply to a number of different sports. For example, in the *Pre-competition and Competition Behavior Inventory* developed by Rushall (1979), an athlete is presented with such statements as, "I get nervous and tense before an important competition," "I mentally rehearse my competition plan before contests," and "When I am tired during a competition, I concentrate on my technique." The athlete is asked to respond to each statement by checking either Always, or Occasionally, or Never. Other examples of across-sport behavioral checklists include the *Post-competition Evaluation Form* (Orlick, 1996), the *Psychological Skills Inventory for Sport* (Mahoney, Gabriel, & Perkins, 1987), and the *Athletic Coping Skills Inventory-28* (Smith, Schutz, Smoll, & Ptacek, 1995).

A w*ithin-sport behavioral checklist* lists performance aspects of practices and/or competitions for a particular sport. Such checklists contain behavioral descriptors and situational examples with terminology specific to a given sport. Martin, Toogood, and Tkachuk (1997) described within-sport behavioral checklists for 21 different sports. The within-sport checklists were positively reviewed (Smith & Little, 1998), and research on the checklists for basketball, swimming, running, volleyball, and figure skating has found them to have high face validity and high test–retest reliability (Leslie-Toogood & Martin, 2003; Lines, Schwartzman, Tkachuk, Leslie-Toogood, & Martin, 1999; Martin & Toogood, 1997). In one study, the within-sport checklists for assessing mental-skills strengths and weaknesses of athletes were completed by a sample of volleyball players, a sample of track athletes,

and their respective coaches. Surprisingly, there was little agreement between volleyball coaches and the athletes that they coached, and between track coaches and the athletes that they coached, concerning the mental-skills strengths and weaknesses of those athletes. In spite of this evidence that the coaches in these samples did not know the mental skills of their athletes, the coaches showed a high degree of confidence in their ability to evaluate the mental-skills strengths and weaknesses of their athletes (Leslie-Toogood & Martin, 2003). Although more research is needed, results to date indicate that such checklists can facilitate behavioral sport psychology consulting.

Another type of behavioral assessment tool is the *Student–Athlete Relationship Instrument,* or SARI (Donohue, Miller, Crammer, Cross, & Covassin, 2007). The SARI was developed to assess sport-specific problems in the relationships of athletes with their coaches, teammates, families, and peers. The initial assessment of the SARI indicates that it has good reliability and validity and that it could be a very useful tool for assessing an important source of variability in the performance of athletes. Interestingly, in a study of the SARI with 198 high school and college athletes, the athletes on average reported strongest happiness with family relationships and least happiness in their relationships with their coaches. For further discussion of behavioral assessment, see Chapters 2, 3, 4, 5, 11, 14, and 15.

Development of User-Friendly Sport Psychology Manuals for Athletes

A book such as this is written for advanced college students and sport practitioners. What about easy-to-use, self-instructional manuals to guide athletes and/or coaches in the use of sport psychology techniques without the aid of a practitioner? That is an area that has also received some attention. Some of the early manuals (e.g., see Nideffer, 1976; Orlick, 1980, 1986; Tutko & Umberto, 1976), often with "sport psyching" or "mental training" in the title, were prepared by practitioners with a cognitive–behavioral orientation and were meant for athletes in general. More recent versions of such manuals include Goldberg (1998) and Orlick (2008). Other manuals have been prepared for athletes in individual sports, such as curling (Martin & Martin, 2006), dance (Taylor & Taylor, 1995), figure skating (Martin & Thomson, 2010), golfing (Martin & Ingram, 2001), and hockey (Martin, 2010). What is needed is research evaluating the effectiveness of such manuals.

Summary

Behavioral sport psychology involves the use of behavioral analysis principles and techniques to enhance the performance and satisfaction of athletes and others associated with sports. Behavioral sport psychology developed a firm foundation in the 1970s with early leadership provided by Brent Rushall, Darryl Siedentop, Thom McKenzie, Ron Smith, and Frank Smoll. Prominent characteristics of behavioral

sport psychology include the following: (a) it identifies target behaviors of athletes and/or coaches in a way that they can be reliably measured, and it uses changes in the behavioral measure as the best indicator of the extent to which the intervention has been successful; (b) its treatment procedures and techniques are grounded in the principles and procedures of Pavlovian and operant conditioning; (c) many of its interventions have been developed by practitioners who follow a cognitive–behavioral orientation; (d) many of its researchers have relied heavily on the use of single-subject research designs; and (e) it places high value on accountability for everyone involved in the design, implementation, and evaluation of an intervention. Major areas of application of behavioral sport psychology have included (a) motivating practice and fitness training, (b) teaching new sport skills, (c) decreasing persistent errors in sport skills, (d) decreasing problem behaviors of athletes in sport environments, (e) managing emotions to maximize athletic performance, (f) using self-talk and/or imagery to improve athletic performance, (g) maximizing confidence and concentration for peak performance during competitions, (h) developing user-friendly behavioral assessment tools for athletes, and (i) developing user-friendly sport psychology manuals for athletes.

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