ELSEVIER

Psychology of Sport and Exercise 7 (2006) 519–524

Psychology
OF SPORT AND EXERCISE

www.elsevier.com/locate/psychsport

Editorial

Judgment and decision making in sport and exercise: Rediscovery and new visions

The study of judgment and decision making (JDM) can be traced back to the late 1940s, evidenced by three major, quite independent approaches: decision- and game-theoretical, psychological, and social–psychological/sociological. Since then, JDM has been studied by researchers from many disciplines, who are especially attuned to the distinctive, yet interrelated facets of the normative and descriptive characterizations of JDM processes (Over, 2004).

Judgments within the JDM tradition have been defined as "a set of evaluative and inferential processes that people have at their disposal and can draw on in the process of making decisions" (Koehler & Harvey, 2004, preface xv). Often, however, these judgments should be separated from the consequences of the decision itself, whereas for decision-making processes the consequences are crucial. The main focus of decision-making research lies in the understanding of choices between a set of options. The broad distinction between judgments and decision-making will be used to map the articles presented in this volume.

Normative theories (for a review, see Baron, 2004) are based on postulates that enable one's optimal maximization of gain and minimization of loss, and are concerned with prescribing human JDM behavior. However, since the introduction of the "bounded rationality" concept by Nobel Prize winner Herbert Simon (1955), the area of JDM has been heavily "psychologized," turning its major focus to more descriptive characterizations of how real people actually behave. Following the seminal work by Meehl (1954) on the differences between clinical and statistical prediction, it has been repeatedly demonstrated that human JDM behavior departs substantially from normative prescriptions. Consequently, the JDM psychology has focused on the gaps between the ideal (i.e., normative) and real (i.e., descriptive) facets of JDM, in an attempt to understand their causes. Currently, JDM is conceived to a large degree in terms of human information processing and is mostly regarded as part of cognitive and social psychology (as is evident from the different approaches to JDM included in Koehler and Harvey (2004).

Almost none of this has been reflected in the sport psychology literature. According to Tenenbaum (2003), the first seminal publication on cognitive sport psychology was Straub and Williams' (1984) collection of theoretical and applied book chapters. In one of the chapters in this volume, Gilovich (1984) stated that the world of sport is most appropriate for JDM research, because it is a potential laboratory for the study of cognitive processes associated with human

1469-0292/$ - see front matter
doi:10.1016/j.psychsport.2006.07.003

JDM. Several years later, Ripoll (1991) edited a special issue of the International Journal of Sport Psychology on information processing and decision making in sport. This publication focused mainly on experiments related to themes such as visual search, semantic and sensorimotor visual function, anticipation and control in visually guided locomotion, timing accuracy and decision time, attention orientation, priming, and cognitive psychophysiology. Ripoll (1991) described these mechanisms as being "specifically concerned with the processes which intervene between the intake of information and the behavioral response, that is to say, between the input and the output.... These processes concern the underlying logic of the system, which corresponds to the 'software'" (p. 187).

Two years later, Tenenbaum and Bar-Eli (1993) published a chapter on decision making in sport in Singer, Murphy, and Tennant's (1993) landmark handbook of research on sport psychology. In this chapter the authors discussed cognitive processes in JDM, such as sensation and memory, short-term store, visual search, attention and concentration, anticipation, field dependence/independence, sport-intelligence, problem solving, and expertise. In addition, they discussed the possible distortions and disturbances in competitive decision making and suggested that Bayes's theorem (see Baron, 2004) be used as a normative model for coping with such inefficient decision processes; as an example, a series of investigations using the Bayesian approach to establishing a crisis-related aid for decisions during competition were described (for a later review, see Bar-Eli, 1997).

Later publications, which addressed the issue of JDM in sport usually, discussed it within specific contexts, each more or less a derivative of the particular framework. For example, Tenenbaum (2003) described various types of decision making and their corresponding cognitive components, and proposed a conceptual scheme of accessing decision-making in open-skill sports. Again, the cognitive approach was used, placing a special emphasis on the information-processing stages underlying JDM; however, the focus was the performance of highly skilled athletes. Along these lines, Tenenbaum and Lidor (2005) explained how the mechanisms determining the quality of JDM are acquired and modified through deliberate practice and expertise development. They emphasized the major role of visual attention in affecting anticipation and the interactive collaboration between working memory and knowledge structure from an applied perspective, elaborated on the efficacy of different cognitive strategies (e.g., attentional control, pre-performance routines, simulation training) in practically enhancing JDM quality in sport. More recently, Williams and Ward (in press) discuss decision making as a derivative of anticipation processes.

The state of JDM in sport is probably most evident from the history of the seminal project of the International Society of Sport Psychology (ISSP), namely—the handbook of (research on) sport psychology (Singer, Hausenblas, & Janelle, 2001; Singer et al., 1993; Tenenbaum & Eklund, 2007). In the first volume, the abovementioned chapter by Tenenbaum and Bar-Eli (1993) was included, whereas the second volume (Singer et al., 2001) does not include a chapter on JDM at all! The third volume includes a chapter on anticipation and decision making, in which, as the authors themselves state, "the discussion is largely focused on the topic of anticipation rather than decision-making per se" (Williams & Ward, 2007).

In the most popular introductory textbook in the field (Weinberg & Gould, 2003), the subject of decision making is treated negligibly, whereas in another book of a more applied nature (Anshel, 2003), this topic does not even exist in the subject index. This is also the case in Horn's (2002) book, which, as is back cover says, "provides the most comprehensive and up-to-date review of

the major trends in sport psychology.'' In addition, it should be noted that in the three-above-mentioned publications, the term ''decision making'' is used (abbreviated as ''DM''), with the ''judgment'' (J) component as good as completely disregarded.

This state of affairs is even more surprising because in 1985 one of the most provocative studies in the history of JDM was published, namely Gilovich, Vallone, and Tversky's (1985) investigation of the misperception of the ''hot hand'' in basketball. In fact, this study was a part of stimulating research on heuristics and biases (see, for review, Gilovich, Griffin, & Kahneman, 2002) which reached its peak in the Nobel Prize awarded in 2002 to Daniel Kahneman for his work conducted jointly with the late Amos Tversky. Gilovich et al. (1985) were interested in studying deeply rooted misconceptions—i.e., beliefs that are neither compatible with normative considerations based on paradigmatic reasoning models, nor with the real physical world—that may dominate human JDM behavior. For that purpose, they demonstrated how the use of the representativeness heuristic (Tversky & Kahneman, 1982) may lead to deficient perceptions of random events during top-level athletic events, such as NBA basketball games. Despite the great theoretical and practical potential for sport psychology, these findings were to a large degree disregarded in the sport-psychology literature, although recently, sport psychologists such as Gula and Raab (2004) began intensively exploring its relevance to sport.

In short, except for what we herewith label ''the Ripoll–Tenenbaum research tradition'' (see Ripoll, 1991; Tenenbaum, 2003), the study of JDM in sport has substantially lagged behind its potential. Our initial idea was to introduce to the readership of PSE different approaches to JDM, which have not been sufficiently covered in sport psychology thus far, in order to stimulate innovative theorizing, research, and application in this area. In fact, we were inspired by what occurred in the domain of goal setting research in sport and exercise: prior to 1985, there were only five empirical studies that were conducted specifically in sport/exercise settings to examine the enhancing effects of goal setting on performance. In the beginning of the 1990s, the number of such studies approximated 15, whereas in the mid-1990s it was about 40; towards the beginning of the 2000s it was already about 70 (Burton & Naylor, 2002). In other words, while considerable research was conducted on goal setting in other settings (e.g., organizational and/or industrial, under the leadership of scientists such as Locke and Latham) before 1985, only after that year did sport/exercise psychologists begin to examine this topic (Weinberg & Butt, 2005). This concerted and systematic effort to study this area began with the publication of Locke and Latham's (1985) article in the Journal of Sport Psychology, in which the possible application of goal setting to sports was first presented. Thus, the publication of this seminal article can be considered a turning point in the history of sport/exercise psychology, in terms of dramatically changing the picture in the important area of goal setting.

We hope that this special issue will have a similar impact on the study of JDM in sports. As can be seen from the tables, this present thematic issue has a total of eight articles—three in the category of judgment (Table 1) and five in the category of decision-making (Table 2).

The papers on judgment were mapped on the basic background of theory as either economics or (social) psychology, and their application is to judges and referees as differentiated from other groups such as athletes, spectators, coaches, managers, and bettors.

The taxonomy of decision-making articles is extended from Townsend and Busemeyer (1995), who proposed that theories in JDM can be aligned within two dimensions, namely as deterministic (i.e., given a set of options, the one with the highest product of utility and expected success is always chosen) or probabilistic (in most cases the option with the highest utility is

Table 1
Taxonomy of judgment articles in the special issue

	Background	
Application	Economics	(Social) Psychology
Judges and referees		Plessner and Haar Boen, Van den Auweele, Claes, Feys, and Cuyper
Athletes, spectators, coaches, managers, bettors	Bar-Eli, Avugos, and Raab	

Table 2
Taxonomy of decision-making articles in the special issue

	Characterization		
Nature	Static	Dynamic	Static/dynamic
Deterministic	Kibele	Bennis and Pachur	
Probabilistic		Johnson	
Deterministic/probabilistic		Araujo, Davids, and Hristovski	Poolton, Masters, and Maxwell

chosen) in nature, and if they can be characterized as static (all options compared at one time) or dynamic (a sample of options are considered in sequential sampling). We added combinations (deterministic/probabilistic, static/dynamic) in both dimensions, because two articles (Araujo, Davids, and Hristovski included deterministic and probabilistic components and Poolton, Masters, and Maxwell did not specify the processes of decision making) required us to extend the original matrix proposed by Townsend and Busemeyer (1995).

Judgment papers

The first article falls into the category of economic theoretical background, with a main focus on bettors, spectators, and players. Bar-Eli, Avugos, and Raab review the existing research on the "hot hand" phenomenon, and it is a natural extension of the study by Gilovich et al. (1985) which significantly stimulated us to initiate this special issue.

The second article falls into the category of (social) psychology, with its main focus on judges and referees in sports. Plessner and Haar present a review paper on how a social cognition approach describes and explains biases in social judgments.

The third article falls into the same category as the previous paper, and is an empirical investigation from a social psychology perspective. Boen, Van den Auweele, Claes, Feys, and Cuyper demonstrate how open feedback changes conformity among judges in rope skipping.

Decision-making papers

The fourth article falls into the category of deterministic and static approaches, and demonstrates how cognitive processes can be utilized for the selection of fast motor responses.

Kibele presents a two-stage process that shows how primed motor reactions rely on earlier learning experience in acquisition and execution.

The fifth article falls into the category of deterministic and dynamic approaches that demonstrate heuristics can explain adaptive behavior in decision-making. Bennis and Pachur present a ''fast-and-frugal'' heuristic approach to athlete decisions as well as decisions of spectators such as bettors.

The sixth article falls into the category of probabilistic and dynamic approaches. Johnson describes how sequential information is sampled based on a ''decision field theory'' applied to the choices of athletes.

The seventh article falls into a category in the taxonomy of decision-making models that was not previously developed, because this article incorporates a dynamic description of decision making with either deterministic or probabilistic components. Araujo, Davids, and Hristovski accentuate the relationship between the performer and his or her environment, from an ecological dynamics approach exemplified by athletes' decisions.

The eighth article does not fall into any of the previous categories, because the decision-making part of the model is left open for further refinement and can therefore be defined as static/dynamic and deterministic/probabilistic. Poolton, Masters, and Maxwell concentrate on the point that implicit motor learning is stable when decision making needs to be processed concurrently during movement execution, for example in fast sports such as table tennis.

We would like to thank the following reviewers for conducting an excellent work on the articles submitted to this special issue (in alphabetical order): Bruce Abernethy, Peter J. Beek, Sian L. Beilock, Ralf Brand, Jerome R. Busemeyer, Thomas Gilovich, Ernst-Joachim Hossner, Joseph G. Johnson, Ronnie Lidor, Clare MacMahon, Jörn Munzert, Henning Plessner, Philippe Sarrazin, Thomas Schack, Sascha Serwe, Gershon Tenenbaum and two anonymous reviewers. We have no doubt whatsoever, that their excellent reviews substantially contributed to the high quality of this product, which—as we hope—will be a cutting edge publication in sport/exercise psychology. We would like to invite you to join in our vision that the various approaches presented in this volume will be applied in diverse domains of sports and exercise. Thus, we hope that this special issue will significantly inspire and stimulate the study of JDM in our exciting and fascinating field.

References

Anshel, M. H. (2003). *Sport psychology: From theory to practice* (4th ed.). San Francisco, CA: Benjamin Cummings.

Bar-Eli, M. (1997). Psychological performance crisis in competition, 1984–1996: A review. *European Yearbook of Sport Psychology*, *1*, 73–112.

Baron, J. (2004). Normative models of judgment and decision making. In D. J. Koehler, & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (pp. 19–36). Malden, MA: Blackwell.

Burton, D., & Naylor, S. (2002). The Jekyll/Hyde nature of goals: Revisiting and updating goal-setting in sport. In T. S. Horn (Ed.), *Advances in sport psychology* (2nd ed., pp. 459–499). Champaign, IL: Human Kinetics.

Gilovich, T. (1984). Judgmental biases in the world of sport. In W. F. Straub, & J. M. Williams (Eds.), *Cognitive sport psychology* (pp. 31–41). Lansing, MI: Sport Science.

Gilovich, T., Griffin, D., & Kahneman, D. (2002). *Heuristics and biases*. Cambridge, MA: Cambridge University Press.

Gilovich, T., Vallone, R., & Tversky, A. (1985). The hot hand in basketball: On the misperception of random sequences. *Cognitive Psychology*, *17*, 295–314.

Gula, B., & Raab, M. (2004). Hot hand belief and hot hand behavior: A comment on Koehler and Conley. *Journal of Sport and Exercise Psychology*, *26*, 167–170.

Horn, T. S. (Ed.). (2002). *Advances in sport psychology* (2nd ed.). Champaign, IL: Human Kinetics.
Koehler, D. J., & Harvey, N. (Eds.). (2004). *Blackwell handbook of judgment and decision making*. Malden, MA: Blackwell.
Locke, E. A., & Latham, G. P. (1985). The application of goal setting to sports. *Journal of Sport Psychology*, *7*, 205–222.
Meehl, P. E. (1954). *Clinical versus statistical prediction: A theoretical analysis and review of the evidence*. Minneapolis: University of Minnesota Press.
Over, D. (2004). Rationality and the normative/descriptive distinction. In D. J. Koehler, & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (pp. 3–18). Malden, MA: Blackwell.
Ripoll, H. (Ed.). (1991). Information processing and decision making in sport. *International Journal of Sport Psychology* (Special Issue).
Simon, H. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, *69*, 99–118.
Singer, R. N., Hausenblas, H. A., & Janelle, C. M. (Eds.). (2001). *Handbook of sport psychology*. New York: Wiley.
Singer, R. N., Murphy, M., & Tennant, L. K. (Eds.). (1993). *Handbook of research on sport psychology*. New York: Macmillan.
Straub, W. F., & Williams, J. M. (Eds.). (1984). *Cognitive sport psychology*. Lansing, MI: Sport Science.
Tenenbaum, G. (2003). Expert athletes: An integrated approach to decision making. In J. L. Starkes, & K. A. Ericsson (Eds.), *Expert performance in sports* (pp. 191–218). Champaign, IL: Human Kinetics.
Tenenbaum, G., & Bar-Eli, M. (1993). Decision making in sport: A cognitive perspective. In R. N. Singer, M. Murphy, & L. K. Tennant (Eds.), *Handbook of research on sport psychology* (pp. 171–192). New York: Macmillan.
Tenenbaum, G., & Eklund, R. (Eds.), Handbook of sport psychology. New York: Wiley, 2007.
Tenenbaum, G., & Lidor, R. (2005). Research on decision-making and the use of cognitive strategies in sport settings. In D. Hackfort, J. L. Duda, & R. Lidor (Eds.), *Handbook of research in applied sport psychology: International perspectives* (pp. 75–91). Morgantown, WV: Fitness Information Technology.
Townsend, J. T., & Busemeyer, J. R. (1995). Dynamic representation of decision-making. In R. F. Port, & T. van Gelder (Eds.), *Mind as motion: Explorations in the dynamics of cognition* (pp. 101–120). Cambridge, MA: MIT Press.
Tversky, A., & Kahneman, D. (1982). Judgments of and by representativeness. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 84–98). Cambridge, MA: Cambridge University Press.
Weinberg, R. S., & Butt, J. (2005). Goal setting in sport and exercise: The theory and practice of effective goal setting. In D. Hackfort, J. L. Duda, & R. Lidor (Eds.), *Handbook of research in applied sport psychology: International perspectives* (pp. 129–144). Morgantown, WV: Fitness Information Technology.
Weinberg, R. S., & Gould, D. (2003). *Foundations of sport and exercise psychology* (3rd ed.). Champaign, IL: Human Kinetics.
Williams, A. M., & Ward, P. Anticipation and decision-making: Exploring new horizons. In: Tenenbaum, G., & Eklund, R. (Eds.), *Handbook of sport psychology.* New York: Wiley, 2007.

Michael Bar-Eli
Ben-Gurion University of the Negev,
Department of Business Administration,
P.O. Box 653, 84105 Beer-Sheva, Israel
E-mail address: mbareli@som.bgu.ac.il

Markus Raab*
University of Flensburg, Institute for Movement Sciences & Sport,
Campusallee 2, 24943 Flensburg, Germany
E-mail address: rabb@uni-flensburg.de

*Corresponding author.