

8

Implicit Learning as a Means to Intuitive Decision Making in Sports

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INTRODUCTION

Distinctions and dichotomies abound in research on cognitive processes such as those between automatic and controlled processes (Shiffrin & Schneider, 1977), which are manifest in a number of domains. However, it is not necessarily useful to draw arbitrary distinctions merely for the sake of classification. As researchers, we should ask ourselves whether such distinctions serve a useful purpose in terms of the theories and models of human behavior that we develop. Supposition of “dual processes” seems to have run its course in some fields such as social psychology (Chaiken & Trope, 1999) in which researchers now have mixed opinions about the need for this a priori assumption (Strack, 1999). In other fields, there seems to be a longstanding, pervasive, and (most important) empirically supported tendency to endorse a discrete division—such as that between implicit and explicit learning styles (Stadler & Frensch, 1998).

Recently, there has been renewed interest in applying such a dichotomy to judgment and decision processes; primarily, this results in a distinction between intuitive and deliberate decision making (T. Betsch, chap. 1, this volume; Sloman, 2002). In this chapter, we seek to integrate the learning style and decision process distinctions in a common framework that allows us to explore their usefulness. Specifically, we analyze decisions in sports—a real-world domain for dynamic

decision making under time pressure—with an emphasis on how learning style and decision process are related.

The remainder of the chapter is organized as follows. First, we describe what we refer to as a decision protocol (cf. Orasanu & Connolly, 1993) to see exactly what processes may be described as intuitive or deliberate and how learning impacts subsequent decision making. Second, we briefly review and summarize some relevant literature on the distinction between intuitive and deliberate decision making in sports and likewise for the distinction between implicit and explicit learning styles. Ultimately, we provide a synthesis of these four (previously independent) concepts in a new model.

A PROTOCOL FOR SPORTS DECISION MAKING

What exactly does making a decision entail? There are many phase models of decision making in the literature (Koehler & Harvey, 2004), but we borrow the decision protocol of Orasanu and Connolly (1993) because it includes the execution of decisions that is especially relevant when considering sports decisions. We apply what Orasanu and Connolly believed to be the seven key components of a decision specific to the domain of sports; this is useful for operational definition in the remaining sections. We note that not every decision situation will be comprised of all seven of these stages. However, these seven stages are particularly relevant for the sports domain that is the focus of this chapter. The sports domain offers a chance to explore real-world decisions, made by motivated and experienced agents, in rich environments under various conditions (e.g., uncertainty, time pressure). We take advantage of this natural opportunity to study decision making that occurs outside of the laboratory on the playing field.

The first step in a decision is the *presentation* of the problem. Although this may seem to be a trivial or obvious step, it has actually been the focus of a great deal of research in judgment and decision making—such as work on framing effects (e.g., Tversky & Kahneman, 1981). That is, the subsequent steps of a decision are not independent of the manner in which a decision is encountered or the way it is presented. The next step is the *identification* of the constraints, resources, and goals facing the decision maker. These properties can be specific, such as limited time or information available, or they can be abstract such as the goal of maximizing expected payoff. Third, the *generation* of possible solutions to the problem, or courses of action, occurs. This step in particular may not be relevant to many laboratory decision-making tasks in which participants are often presented explicitly with the options from which they must choose.

The fourth step of the decision-making protocol, *consideration* of possible solutions, is the one typically regarded as representing the whole of the decision-making process. By this, we imply that the first three stages are often taken for granted—if they are appreciated at all—in much decision-making research. Similarly, the next two stages are rarely dissociated from the output of the consideration phase. *Selection* of a course of action is generally seen as synonymous with identifying the “winner” of the consideration phase; and *initiation* of the selected action is almost

always seen as a straightforward extension of a mentally selected option to a physically realized one. Finally, the last stage of a decision protocol is the *evaluation* of the decision made including the appraisal of feedback information if any exists.

We offer a brief sports example to illustrate each of these seven stages. Imagine a forward in soccer who is dribbling toward the goal and is approached by a defender. At this point, the decision problem has presented itself: what action to take in response to the approaching defender. The forward identifies the constraints on his behavior (e.g., he cannot pass offside) and prioritizes his goals (e.g., above all, retain possession; but score if possible). In light of these, he generates possible options that he may undertake such as shooting at the goal, passing to a wing player, or dribbling away from the defender. He considers these courses of action, perhaps by ranking them according to their likelihood of achieving his top goal (retaining possession). Then, he selects an action; this is likely to be the one with the highest rank. He initiates the action by physically performing so as to bring about the action he selected (e.g., physically dribbling the ball to the right). In doing so, he buys time for the wing player to streak toward the goal where he passes the ball and assists in a score—resulting in positive evaluation of his decision.

INTUITIVE AND DELIBERATE PROCESSING IN SPORTS

To begin our discussion of intuitive and deliberate processes, we are careful to employ a particular operational definition. Intuitive processes are generally assumed to be automatic activations of (semantic) networks (Anderson, 1983). We follow suit in defining *intuitive* (as opposed to deliberate) decisions as fast decisions that are based on a perceived pattern of information that is often linked automatically to a specific action or sets of actions (see Hogarth, 2001). However, we stress that routine behavior is not the same as intuitive processes. Rather, the latter may serve as a basis for the former, especially in the absence of creative or emotional aspects not in line with an automatic information-processing perspective (Schönplflug, 1994, but see Lieberman, 2000). Therefore, the link between intuitive processes when deciding and the preference to use these (as opposed to deliberative) processes is derived through tacit information accumulated over long-term experience (e.g., Epstein, chap. 2, this volume).

We prefer to view decision-making style as a continuum rather than as a dichotomy (cf. Hamm, chap. 4, this volume; Hammond, 1996). That is, rather than classifying behavior as intuitive or deliberate, it may be more fruitful to consider a spectrum of decision-making processes with these two extremes. Because decision-making processes cannot be directly observed, they are often operationalized by measures such as deliberation time or susceptibility to dual task interference (e.g., deliberate processes are slower and more susceptible; Kahneman & Frederick, 2002). In this context, we only have ordinal relations to claim one process is “more intuitive” than another, or we must introduce some threshold or criterion for determining, for example, how quickly a process must occur to be considered intuitive. With this continuous nature in mind, we now describe what “more deliberate” or more intuitive decision making suggests for the relevant stages of our protocol.

Intuitive and Deliberate Processes in the Decision Protocol

We can precisely localize the influence of intuitive versus deliberate processes by utilizing the seven-stage schematic we developed in the previous section. That is, we now see exactly where and how intuitive decisions may differ from deliberate ones. When one speaks of intuitive and deliberate decision making, it does not necessarily mean that the entire protocol is performed intuitively or deliberately. Rather, we should independently consider each phase of the decision protocol. For example, the presentation and identification of information for the aforementioned soccer player may foster intuitive processes only if a coach constructs situations of high time pressure. Indeed, we conceptualize the distinction between these two processes primarily in the third and fourth stages (generation and consideration)—the key internally active segments of the decision-making protocol. Traditionally, these two stages have not been considered together in decision-making research. There has been relatively little research on how options are generated—because they are often explicitly presented in experiments—and even less that have related option generation to subsequent consideration and selection (for notable exceptions, see Johnson & Raab, 2003; Klein, Wolf, Militello, & Zsombok, 1995). Nevertheless, we can employ concepts and results from previous research in determining which decision-making process may result.

Option generation can be performed deliberately in which rules may dictate how to develop viable solutions to a problem (Slovan, 2002). In contrast, option generation may be akin to spreading activation in a representation network, proceeding with little conscious effort or direction (Johnson & Raab, 2003). For example, suppose the first option generated by the soccer forward in the preceding example is a pass to the right wing player. Depending on the organization of the forward's internal corpus of options, spreading activation would suggest that options that are most similar to this first option would be generated next (Johnson & Raab, 2003; Klein et al., 1995). If similarity is based on the spatial attributes of options, then perhaps the next generations may be passing to the right fullback, dribbling to the right, shooting to the right of the goal, or lobbing to the right corner. In contrast, deliberate option generation suggests more formal rules for determining the order of generated options. Perhaps training has taught the forward to always generate passing options prior to shooting options, which would change the order of generated options (and the options themselves) in our example.

Consideration of the generated options occurs independently from the generation process—intuitively generated options may be considered deliberately, for example. A great deal of research has examined intuitive versus deliberate processes of consideration, to which we cannot devote a great deal of discussion here (see, for an overview, Glöeckner, chap. 19, this volume; Plessner & Czenna, chap. 15, this volume). Intuitive consideration may involve little or no actual consideration at all: favor what is most salient or most readily comes to mind; see if each option, in turn, is sufficient on all attributes; do what one did the last time; and so forth. A deliberate process may involve relatively simple rules or heuristics (e.g., Gigerenzer, Todd, & The ABC Research Group, 1999) or more cognitively intensive algorithms such as weighted summation.

