

Psychological Investigations of Competence in Decision Making

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Introduction: What Does It Mean to Be Competent?

Kip Smith, James Shanteau, and Paul Johnson

This book departs from the more traditional topics of judgment and decision-making research. It emphasizes neither the deficiencies of human cognition, nor heuristics and biases, nor behavior in carrying out tasks to which no one is particularly well adapted. Rather, it introduces two task-general sources of competent decision making in a wide variety of professional domains. In this introductory note, we summarize the genesis of this project and define what we mean by competence.

Recent summaries of work on expertise have focused on the measurement of expert (optimal) performance, its replication in laboratory settings, the mediating mechanisms for such performance, and the role of deliberate practice in achieving it. Clear examples of expertise in this sense occur in games, in athletic and musical performance, and in certain types of work.

The premise of this book is that much activity in everyday life and work is not of this sort. Many of the situations we encounter are novel, infrequent in our experience, or variable with respect to presenting conditions and the action to be taken. Such tasks require decisions to be made and actions taken in the face of ambiguous and/or incomplete information. Time pressure is frequently great, and the penalties for failure are often severe.

Examples of such situations include investing in a market, controlling an industrial accident, and detecting fraud. These are all environments that defy a definition of optimal performance. Practice may be beneficial but is unlikely to be the sole foundation for skilled performance. Indeed, the idea of optimal performance often does not apply, yet the benefits of successful decision making are considerable. Typically, in these domains there are also individuals who perform better than others.

In these and other, less dramatic situations like weather forecasting and probability estimation, individuals may use knowledge that is quite different from that of someone whose work is based on practice in achieving a known or computable standard (e.g., scheduling airline reservations). We refer to domains without criteria for optimal performance as *competency-based*, and we describe the behavior of individuals who work in them by the term *competence*.

In competency-based domains, we expect the mechanisms that govern actions taken to achieve goals to invoke task-general cognitive processes that redefine the role of the agent or the task constraints. For example, representational structures may be used to redefine the task or to distribute task components so that the agent is no longer taxed beyond her capacity. Alternatively, the task at hand may be recast as an instance of a broad class of tasks for which evolution has provided an adaptive metacognitive process.

We identify a pair of metacognitive processes that give structure to otherwise ill-structured tasks. The first we call *metacognition-self*, the second *metacognition-others*. Metacognition is thinking about the kind of thinking that a task requires. Metacognition-self is an introspective reevaluation of ongoing or planned cognitive activity and behavior. By taking this internal stepping-back, an agent may put herself within the situation and become able to identify herself as a source of task constraint. This task-general process may lead the agent to recast her role or to redefine the task, which may, in turn, facilitate performance. The chapter by Dominguez et al. illustrates the power of using metacognition-self in the operating room. Pliske et al. discuss how metacognition-self provides the flexibility needed when making a weather forecast.

The second metacognitive process is metacognition-others, thinking about others' thinking or, at the least, thinking about how others ought to be thinking. By jumping into others' minds, by taking a normative stance about how they should be processing information, an agent may be able to predict their thoughts, decision making, and behavior. This task-general process may lead the agent to update her goals or refocus her attention to critical cues, which may, in turn, facilitate performance. The chapter by Skriver et al. presents a study of a daunting situation in which metacognition-others saved many lives. Jones shows how metacognition-others is a key element in the successful design of human-computer systems. Grazioli et al. present empirical work in a pair of domains, fraud detection and spot currency trading, in which

metacognition-others is the sole basis for agent differentiation and superior performance.

In addition to addressing the two central competence enablers – metacognition-self and metacognition-others – each chapter in this book enriches our understanding of the basis of skill and of success in the performance of decision-making tasks generally and in specific domains of work and society.

Jones and Pliske et al. discuss how addressing domain-specific constraints is a cornerstone of competent performance. The domains are quite different, but the approach is similar. Grazioli et al. and Kurz et al. identify sources of power in performance. The sources are neither processing speed, nor precision, nor the ability to remember large amounts of information. Rather, all four chapters illustrate that competency is an issue of adaptation and fit to task demands. As Simon argued in *Sciences of the Artificial*, once adapted, the agent simply does what the task requires. If we wish to understand the basis for an agent's success, we need to understand the structure of the task in which the behavior occurs. We must understand what the invariants are and how successful behavior is explained in terms of them.

A related issue is the problem of generativity. The chapters by Hardman and Ayton, Skriver et al., and Dominguez et al. address how far performance on familiar tasks can be extended when dealing with novelty. Task-general cognitive processes that redefine the role of the agent or the constraints of the task prevent performance from deteriorating dramatically as one moves away from the normal day-to-day routine.

The final three chapters in this volume address a more traditional competence enabler – representation that fits the demands of the task and the bounded rationality of the decision maker. Hardman and Ayton argue that argumentation provides fitting representations that support competent decision making under ambiguity and ignorance. In addition, argumentation explains several systematic deviations from the prescriptions of expected utility theory. The chapter by Kurz et al. addresses a topic that has been a mainstay of research in judgment and decision making: the representation of probabilistic information. They offer alternative accounts for procedures that reformulate the task and that markedly improve performance. Weiss and Shanteau address the issue of evaluating competence in domains in which not all agents working on a given task behave alike. Presumably, the learning history of each

individual results in a specific adaptation to the task. However, each individual's adaptation results in unique performance. The authors show how we can understand competence in the face of variability.

As the editors of this book, our goal has been to open a new direction for judgment and decision-making research. Academic research generally and our society particularly have largely neglected the fact that sound judgment and decision making are the crux of many professions. By understanding and communicating what professional decision makers do and how they do it well, we make valuable contributions both to our field and to the professional community at large.