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How Experts Make Decisions: Beyond the JDM Paradigm

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It is encouraging to hear the call put forward by Dalal et al. (2010) for a greater emphasis on decision making in the industrial–organizational psychology and organizational behavior (IOOB) community. The authors have clearly identified a large opportunity for researchers and practitioners alike to benefit greatly. However, there are reasons that traditional judgment and decision-making (JDM) research has received limited applied success in organizations to date. In this article, we outline some of those issues and discuss how a parallel perspective investigating expert decision making—the naturalistic decision making (NDM) paradigm—may be able to contribute to a stronger JDM discipline and a broader IOOB perspective on understanding and improving decision-making performance in organizations.

To that end, we address four primary objectives. First, we detail some of the obstacles to translating much of the traditional JDM literature into organizations as well as how an emphasis on expert decision making can overcome these obstacles. Second, we provide an introduction to the NDM perspective, its history, and some exemplar theories and findings. Third, we discuss NDM methods for improving decision-making performance in modern organizations. Fourth, potential future directions are discussed. Like Dalal et al., we believe that it is an exciting time for decision-making research and that there is ample opportunity for researchers and practitioners from NDM, JDM, and IOOB to gain from discussion and collaboration.

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Why Focus on Expert Decision Making?

To be of value to IOOB researchers and practitioners, decision-making research should be capable of guiding organizational interventions and practice. However, there is scarce evidence suggesting traditional JDM has met with success in this area to date. Dalal et al. outline some of the general criticisms of JDM research. Several of these are expanded upon below as they represent significant challenges to application in many work settings. These include:

- Traditional JDM research tends to conceptualize and operationalize decision making as *choice between concurrently available options provided to the decision maker* and downplay the process of option generation or, even more fundamentally, information

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gathering and sensemaking about a situation.
- Use of *context-free, knowledge-lean decision-making tasks and novice users* that ignores qualitative differences in expert performance.
- Use of *unrealistic models as criterions of effectiveness.*

The above issues have limited the applicability of JDM to modern organizations in many cases. However, these issues can be overcome by focusing on the decision-making performance of experts in context within organizations. Experts, by definition, perform at reliably superior levels of performance when compared with nonexperts. Consequently, they provide naturally occurring models of how effective decisions can be made in complex and demanding situations. This understanding can then form the basis of interventions for supporting experts in their tasks, accelerating the development of more experts with developmental opportunities and performance supporting tools. The following sections provide a brief overview of a relatively new community of decision-making research and practice—NDM—working to meet these exact goals.

The Naturalistic Study of Decision Making

The primary goal of NDM is to explain how people ''use their experiences to make decisions in field settings'' (Zsambok, 1997, p. 4). Although a full history of NDM is beyond the scope of this commentary (for more detail, see Hoffman & Militello, 2009; Salas, Rosen, & DiazGranados, in press), a brief review will be provided for context. NDM began in the 1980s as researchers started to investigate the decision-making processes of firefighters and intensive care unit nurses (Calderwood, Crandall, & Klein, 1987; Crandall & Calderwood, 1989), and intensified following the tragedy of Iran Air Flight 655 being mistakenly shot down by the USS Vincennes in 1988 because of poor decision making (Cannon-Bowers & Salas, 1998). This catastrophe highlighted the need to better understand and improve decision making in real-world, complex situations, as traditional JDM research provided little insight into what had happened, why it happened, or how to prevent it from happening again.

NDM has evolved specifically to address such situations, with settings of interest typically involving extreme time pressure, high stakes, ill-defined goals, dynamic conditions, and tasks that involve large quantities of information, complex decisions, and decision-maker expertise (Cannon-Bowers, Salas, & Pruitt, 1996; Orasanu & Connolly, 1993). Furthermore, as these real-world situations show that decision making can be quite context dependent, NDM emphasizes the concept of building context-sensitive models of decision making for specific domains (Lipshitz, Klein, Orasanu, & Salas, 2001). This is not to say that NDM does not rely on previous theoretical models of decision making; indeed, NDM draws upon principles of expertise, cognition, ecological decision making, and related areas. Expertise is particularly key to real-world decision making, as individuals tend to rely upon their experiences to determine how to act in future experiences. There are several critical mechanisms of expert decision making that have emerged in the NDM literature. Table 1 provides an overview of these mechanisms at the individual level.

Though context specific, NDM models converge in that they represent decision making in terms of sequential, single-option generation and evaluation (Klein, 2008). That is, instead of generating option sets as outlined in traditional JDM approaches, people in many real-world situations tend to use prior experience to quickly categorize situations, generate an option based on previous experience (i.e., an option that has been successful in the past), evaluate that option's fit to the current situation, and then adopt, modify, or reject that option. Given that the situations faced by those that IOOB practitioners serve may often be these types of complex, demanding contexts, NDM has much to offer the IOOB world.

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Table 1. *Mechanisms of Expertise and Individual Decision Making (From Rosen, Salas, Lyons, & Fiore, 2008)*

Expert decision makers. . .
Are tightly coupled to cues and contextual features of the environment
They develop psychological and physiological adaptations to the environment.
They are sensitive to and leverage contextual patterns of cues in decision making.
Have a larger knowledge base and organize it differently than nonexperts
They have a more conceptually organized knowledge base.
They have more robust connections between aspects of their knowledge.
They have a more abstracted and functional knowledge base.
Engage in pattern recognition
They perceive larger and more meaningful patterns in the environment.
They are able to detect subtle cue configurations.
They are able to retrieve courses of action based on situation/action-matching rules.
Engage in deliberate and guided practice
They devote time and effort to improving knowledge and skills.
They have high motivation to learn and long-term learning goals.
Seek diagnostic feedback
They seek out input from other experts.
They self-diagnose performance, and identify weaknesses in their knowledge and processes, and correct them.
Have better situation assessment and problem representations
They spend more time evaluating the situation.
They create deeper, more conceptual, more functional, and more abstracted situation representations.
Have specialized memory skills
They functionally increase their ability to handle large amounts of information.
They anticipate what information will be needed in the decision making.
Automate the small steps
They quickly and effortlessly do what requires large amounts of attention for nonexperts.
They have more cognitive resources available for dealing with more complex aspects of decision making.
Self-regulate and monitor their processes
They evaluate their own understanding of a situation.
They judge the consistency, reliability, and completeness of their information.
They make good decisions about when to stop evaluating the situation.

Improving Decision-Making Performance

NDM has made significant contributions to application in its short life span and has rapidly been adopted by organizations such as the military. The following provides a brief overview of the key characteristics of successful NDM interventions.

In contrast to traditional JDM, the primary emphasis of NDM is to develop an understanding of real-world decision making that can be used to improve performance. Interventions developed from traditional JDM sought to ''cure'' people of bias. Such approaches have been limited in success. However, NDM interventions attempt to capitalize on and reinforce the strengths of human decision makers. This is achieved primarily through training programs designed to experientially build expertise within a domain as well as

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the design of work processes and physical artifacts (e.g., displays, sociotechnical systems) that support expert decision-making processes. Ideally, these two aspects will be developed in tandem such that decision makers are provided with the skills and experiences as well as the technological support tools needed for improved decision making. In addition to NDM training, organizations and IOOB practitioners can apply several core principles of the acquisition of expertise to the developing decision makers: practice, continuous learning, motivation and learning goals, and feedback (for more detail, see Salas & Rosen, 2010; Salas et al., in press). These principles can guide a variety of developmental interventions throughout the career of professionals making decisions in complex domains.

Toward an Applied Science of Decision Making

There is undoubtedly common ground between the NDM, JDM, and IOOB communities of research and practice. There are shared goals and shared interests. But, how can each of these areas benefit from collaboration? And, perhaps more importantly, what is the path toward a theoretically and methodologically strong applied science of decision making capable of guiding practice in organizations? Several potential paths forward are discussed below.

First, *JDM can become more realistic.* This involves both the conceptualization of decision-making processes as well as the methods used in studies. Some of the strengths of traditional JDM outlined by Dalal et al. involve the ''cleverness'' of experiments. These criteria of success need to be replaced with a serious consideration of external validity and practical relevance. From an IOOB perspective, which values the ability to inform organizational practice, JDM has fallen short of this goal in favor of questions and methods that in some cases control the reality out of the research. Of course the accumulation of knowledge requires a strong experimental approach, but there are compromises between pure laboratory and pure field studies (e.g., bringing the field to the laboratory with the use of realistic simulations and expert participants).

Second, *NDM can become more rigorous.* Although this article presented criticisms of traditional JDM, there are of course limitations to the NDM research perspective as well. In some senses these limitations are the result of a reaction against traditional JDM. Overly abstract decision-making tasks and questionable external validity in JDM led to NDM research that has been primarily descriptive in nature and consequently tied to a specific context. Stronger theory development and prospective evaluation of predictions of existing theories are some of the critical needs for the NDM research community along with greater formalization and replicability of field methods for investigating expert decision makers.

Third, *IOOB can bridge the divide.* The IOOB community may be poised to balance the strengths and weaknesses of the JDM and NDM communities. With a strong emphasis on methodological rigor and sensitivity to organizational needs and priorities, IOOB can potentially make high impact contributions to the science and practice decision making in organizations.

It is clearly an exciting time for decision-making research. Dalal et al. have identified a potentially monumental opportunity and initiated a much needed dialogue within the IOOB community. We hope this response prompts readers to think more broadly about decision making as well as the potential role for IOOB in this field poised for growth. Specifically, IOOB researchers and practitioners can go beyond adopting and applying JDM research and play a pivotal role in remaking the field into an applied science of decision making capable of positively impacting work practices.

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