Leveraging the Multiple Lenses of Psychological Science to Inform Clinical Decision-Making: Introduction to the Special Section

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Abstract

Understanding how clinicians and laypeople make critical decisions related to the assessment, diagnosis, and treatment of mental health is an important step toward improving mental healthcare. This Special Section features new research that, collectively, leverages interdisciplinary approaches from basic psychological science to enhance our understanding of clinical decision-making. In this "Introduction to the Special Section," we illustrate how three tasks integral to clinical decision-making (assessment, diagnosis, and treatment selection) can be reframed as specific examples of more basic cognitive processes. We conclude by highlighting challenges to conducting interdisciplinary research on clinical decision-making, by providing an overview of the contributions in this Special Section, and by presenting a list of essential readings on clinical decision-making.

Keywords

clinical decision-making, cognition, biases, treatment

Delivering and receiving mental healthcare is about making decisions. Clinicians make decisions about whether a potential patient needs care, and if so, they must decide which treatment to select. Over the course of treatment, clinicians must decide how to assess whether a treatment effectively meets a patient's needs and improves his or her mental health. These decisions dictate the course and outcome of patients' mental health concerns. Laypeople also make crucial decisions about mental healthcare. Parents decide whether their child's behavior warrants a visit to the doctor. Spouses decide whether to initiate a conversation with their partner about their worries, low mood, or alcohol use and whether seeing a professional might improve their well-being. Regardless of the nosological paradigm a clinician uses to conceptualize mental health concerns, the type of training a clinician has received, the beliefs a patient may hold about his or her illness, or the resources a layperson consults to help a loved one, the people involved in mental healthcare inevitably make decisions about the nature and extent of this care (hereafter broadly referred to as *clinical decision-making*).

We can understand clinical decision-making by examining it specifically in the context of the clinical realm through research focusing on such issues as diagnostic reliability (Hunsley & Lee, 2014; Wood, Garb, Lilienfeld, & Nezworski, 2002), the links between clinicians' experience and patient outcomes (Dawes, 1996; Garb, 1989), or the development of empirically supported treatment (Chambless & Ollendick, 2001) and assessment (Hunsley & Mash, 2007) procedures. For decades and with few exceptions (cf. the work of Howard Garb; Garb, 1989, 1998, 2005), clinical psychological

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science has relied largely on such research, which focuses on examining clinically specific tasks and outcomes. However, in streams of research that often run parallel to those in clinical psychological science, many other areas of psychological inquiry address issues that are central to or can greatly inform clinical decision-making. In this Special Section, we present research from these parallel streams of research that adopt trans- and interdisciplinary approaches to understanding issues surrounding clinical decision-making.

To frame this Special Section, we address several key issues to be considered when drawing from multiple research traditions to understand clinical decision-making. First, we illustrate how work in basic cognitive science can inform research and theory on clinical decision-making. Second, we discuss obstacles to conducting multidisciplinary work on these issues, along with questions that arise for clinical psychological scientists when conducting interdisciplinary science. Finally, we describe the empirical and theoretical contributions in this Special Section.

Framing Clinical Decision-Making Using Cognitive Science: An Illustration

The basic processes of human cognition operate in clinical settings as they do in any other setting. That is, although clinicians and laypeople differ in their training for understanding mental health concerns and delivering mental healthcare, their involvement in clinical decision-making is still influenced by basic attention, judgment, categorization, and reasoning abilities, and how these abilities function when making the kinds of high-stakes decisions inherent to mental healthcare. In fact, clinical decision-making can be studied as domain-specific examples of more general cognitive processes. In thinking of clinical decision-making in this way, we can start to think more broadly about what other literatures may inform these decisions and, in terms of cognitive science, what thought processes may be involved in clinical decision-making (Witteman, Harries, Bekker, & Van Aarle, 2007). To illustrate this point, we provide three examples of how components of reasoning regarding mental health issues from across an array of clinical decision-making tasks (assessment, diagnosis, treatment selection) can be reframed in terms of more general cognitive processes.

First, consider clinical assessment. Gathering information about the problems a person is experiencing is one of the first tasks of the practitioner. A clinician may do this through a formal assessment, whereas a layperson may do this through asking a loved one about his or her life and major sources of distress. In both cases,

the information gatherer is learning information that must be integrated in some way to understand the concerns experienced by the person in question. A large literature in cognitive science has explored how people gather information and integrate it to form hypotheses and beliefs about the world. People tend to form beliefs early in the information-gathering process (Hogarth & Einhorn, 1992), with these beliefs often driving interpretations of information gathered later (e.g., Marsh & Ahn, 2006). More generally, people do not generally process and integrate data objectively when forming beliefs. Rather, people process information through an interpretative lens of early-formed beliefs (Luhmann & Ahn, 2011; Marsh & Ahn, 2009). In fact, a long line of research in cognitive science finds that even the most basic pieces of evidence can be reinterpreted as a function of the knowledge and beliefs of the information gatherer (Asch, 1946; Medin, Goldstone, & Gentner, 1993; Schyns, Goldstone, & Thibaut, 1998). In addition to formed beliefs changing how information is interpreted, once people form a hypothesis, they tend to adopt a focused approach to searching for data related to that hypothesis. Specifically, people selectively search for evidence that confirms rather than disconfirms their hypotheses, a tendency known as a confirmation bias (Klayman & Ha, 1987, 1989; Nickerson, 1998; Wason, 1960). All of this work suggests that the intake of basic information in the world is to a large extent a dynamic, top-down process.

Research on belief revision and hypothesis generation provides a base for how to think about clinical assessment. That is, this work suggests ways that assessment is influenced by basic cognitive processes inherent in integrating all kinds of information, of which information about mental health symptoms serves as an exemplar. Early-formed beliefs can influence information-gathering in many ways, from intake assessments to monitoring treatment response. For instance, beliefs formed early on about the effectiveness of therapeutic procedures can result in a clinician perceiving that a patient benefited from treatment even when this perception is inaccurate (e.g., Lilienfeld, Ritschel, Lynn, Cautin, & Latzman, 2013). Similarly, a clinician performing an intake assessment may select assessments to administer and information sources on which to rely (e.g., parent and/or teacher reports in the case of child and adolescent assessments) depending in large part on information coming from the individual who contacted the clinic to initiate care (e.g., self-referral in the case of adult patient or parent in the case of child patient; De Los Reyes et al., 2015; Youngstrom, 2013). Overall, work in cognitive science informs clinical decision-making at many levels of the assessment process.

Next, consider diagnosis. Even when clinicians do not use a formal diagnostic nosology to guide their case formulations, at some point a clinician decides (a) whether a patient's thoughts, emotions, and/or behavior require care and (b) what label or labels may best describe the problem or problems that require treatment. Laypeople may likewise seek to label what problems their loved ones are experiencing (e.g., sadness, worry, substance use, anger). The process of diagnosis can be understood as an example of the general process of categorization (Brooks, Norman, & Allen, 1991; Elstein & Schwarz, 2002). Using the language of categorization research, the signs and symptoms of a disorder become the *features* of a category and patients who are being diagnosed become *exemplars* of that category. Thinking of diagnostic processes in this way can allow the decades of research on (a) how people represent categories (Medin & Schaffer, 1978; Murphy & Medin, 1985; Rosch & Mervis, 1975), (b) what types of features are most important for categorization (Ahn, Kim, Lassaline, & Dennis, 2000; Ahn, Marsh, Luhmann, & Lee, 2002; Ahn, Taylor, Kato, Marsh, & Bloom, 2013; Gelman, 2003), and (c) how category knowledge allows us to reason about newly experienced instances of a category (Proffitt, Coley, & Medin, 2000; Shafto, Coley, & Baldwin, 2007) to inform how we think about diagnosis. In particular, categorization researchers make important distinctions between a *category*—a class of objects that exist in the world—and a *concept*—a person's mental representation of that category (Murphy, 2002). Differentiating categories from concepts highlights an important premise in categorization research: namely, that people's concepts are not necessarily mirror images of their corresponding categories in the real world. In this vein, people's theories—explicit, implicit, or both—of how the features of a category are interrelated shape how they categorize exemplars (Ahn & Kim, 2001; Kim & Rehder, 2011; Lombrozo, 2006; Murphy & Medin, 1985; Rehder, 2015; Wisniewski & Medin, 1994).

Thinking about cognitive processes implicated in categorization can provide interesting insights into the formal and informal processes of diagnosis. A recurrent issue in diagnosis concerns the levels of reliability obtained when two or more clinicians examine the same patient (i.e., *interrater reliability*; Hunsley & Lee, 2014; Jensen & Weisz, 2002). Clinicians may hold different concepts of a given diagnostic category that arose from the training they received, what features of the category they have grown to believe are the most important for diagnosis, the specific exemplars of the categories they have encountered, or all three. From a categorization point of view, these differences in mental representations of the diagnostic categories should result in different categorizations (e.g., Kim &

Ahn, 2002). In support of this view, consider that clinicians from different training backgrounds (e.g., psychiatrists, psychologists, social workers) and care settings (e.g., private practice, school, inpatient, outpatient) often vary in the value they place on making diagnoses and report different preferences for their method of obtaining clinical information to make diagnoses (e.g., structured vs. unstructured interviews; Jensen-Doss & Hawley, 2011). Overall, understanding the link between the concepts or preferences that clinicians develop through their clinical training and practice and the processes through which they diagnose patients provides insight into important issues relevant to diagnostic reliability.

Finally, consider treatment planning. One step in choosing a treatment to address a patient's mental health concerns involves generating hypotheses regarding the cause(s) of the patient's concerns and selecting a treatment that either addresses the cause(s) directly or reduces the frequency, intensity, or duration of its signs or symptoms. This process of identifying causes and selecting treatments can be thought of as a specific example of causal reasoning. Research in basic cognitive science indicates that people possess many constraints about what they believe must be true for an event or object to be a good candidate cause of an observed effect. For example, a cause should temporally precede its effect without too large of a gap in time (Buehner & May, 2002; Einhorn & Hogarth, 1986; Hagmayer & Waldmann, 2002; Michotte, 1946) and causes should be similar in magnitude to the effects they produce (Einhorn & Hogarth, 1986; LeBoeuf & Norton, 2012; Michotte, 1946; Nisbett & Ross, 1980; Shultz & Ravinsky, 1977). Understanding how people identify candidate causes can inform the types of causes that people select as likely to be generating mental health concerns. Once the relevant causes are identified, people can form a mental causal model of which events produce other events. Such causal models allow a reasoner to select actions, termed *interventions*, that can be administered to a *cause event* in the model to prevent or produce a given *effect event* (Hagmayer & Sloman, 2009; Hagmayer, Sloman, Lagnado, & Waldmann, 2007). Implementing a treatment to reduce problematic symptoms can be thought of as a domain-specific example of this type of intervention reasoning.

Basic research on causal reasoning bears clear implications for research on clinical decision-making as they relate to treatment planning. Indeed, this work may inform research on long-standing concerns regarding the gap between what treatments are supported by controlled research on their outcomes (i.e., empirically supported treatments) and the treatments that clinicians

choose to administer in usual care settings (e.g., community mental health centers, hospitals, solo practitioners' offices; Weisz, Jensen-Doss, & Hawley, 2006). Much of the research on the *research–practice gap* focuses on barriers related to gaining the expertise to implement empirically supported treatments in usual care settings, such as the paucity of available training resources to learn new treatments (e.g., intensive workshops; professionals in the local community who have the expertise to provide peer supervision; Kazdin, 2017; Lilienfeld et al., 2013). In addition to these key barriers, how clinicians think about the causes of patients' concerns and how available treatments address those causes are probably at play. For instance, based on research and theory on causal reasoning, one might predict that a clinician who does not deliver empirically supported treatments for a given condition (e.g., behavioral activation for adult major depressive disorder) would be less likely to consider modifying his or her treatment approach if the "active ingredients" of the treatment (e.g., decreasing anhedonia by increasing exposure to pleasurable activities; Lewinsohn, Munoz, Youngren, & Zeiss, 1986) do not "match" the clinician's beliefs of what causes patients to experience the condition (e.g., low social support causes depression). More generally, understanding how clinicians and patients think about the causes of disordered symptoms can illuminate their perceptions about the appropriate treatments for those problems.

In this section, we provided a series of examples to illustrate the relevance of cognitive science for understanding clinical decision-making. These examples are by no means the only ways in which research and theory on clinical decision-making could be informed by basic cognitive science (e.g., diagnosis can be thought of as heuristic-based decision-making; Elstein & Schwarz, 2002). Most, if not all, clinical decision-making is generated by cognitive processes (e.g., attention, learning, memory, reasoning) that have a long history of study in basic science. The act of identifying those analogues can inform research on clinical decision-making and opens new doors toward previously untapped knowledge in the field.

The Difficulty in Doing Interdisciplinary Research on Clinical Decision-Making

Our argument in this Introduction and throughout the articles in this Special Section is that studying clinical decision-making from multiple disciplines and perspectives can inform and shift our thinking about these decisions. Yet such interdisciplinary research, important as it is, remains in woefully short supply in clinical psychological science. Why? One obstacle to conducting interdisciplinary research on these issues is that crossing different streams of research often involves breaking down language barriers, some of which may reflect deeper conceptual barriers. We have provided examples of how research on assessment, diagnosis, and treatment planning bears discernable links to research and theory on specific cognitive-processing domains. The act of establishing these linkages is less than straightforward, even when considering science within subdisciplines of the same field. Indeed, scientists in different subdisciplines in psychology often lack the expertise to delineate how their research connects to clinical decision-making and vice versa. For instance, just as the solo clinical scientist may not perceive how an important clinical task such as case formulation could be thought of as a broader type of cognitive processing, the solo cognitive scientist may struggle to identify realistic clinical scenarios that are exemplars of the cognitive-processing domains that he or she studies.

Just as talking with native speakers of a language helps us to learn a new language, talking to researchers in other areas of psychological science can help us translate the language of their domains of research interest to ours. That being said, for any two languages one will not find a dictionary equivalent for every word of one language in the other. Similarly, we must be open to the idea that specific domains relevant to clinical decision-making may not possess straightforward analogues in other areas of research. In framing clinical decisions in ways that allow for study from other fields or perspectives, our assertions must make sense in our shared language. To make this point concrete, take the example of research on therapeutic expertise. Patients provided therapy by experienced mental health clinicians often evidence similar rates of improvement as do patients treated by trainees with far less experience (e.g., Durlak, 1979; Faust & Zlotnick, 1995). Such findings have been invoked in support of the claim that there is little or no benefit to expertise in the mental health domain, a view that has at least some empirical support (Tracey, Wampold, Lichtenberg, & Goodyear, 2014). A total absence of expertise effects in the mental health domain would be surprising to cognitive scientists, given that effects of expertise have been shown in a myriad of domains and professions (for a review, see Ericsson & Lehmann, 1996; but see Kahneman & Klein, 2009, for evidence that the conditions for intuitive expertise are often quite constrained). However, cognitive versus clinical traditions often conceptualize and measure expertise in substantially different ways. For example, much of the basic research on expertise in cognitive psychology has relied on measures such as changes in memory recall for domain-relevant information or changes in how knowledge about the domain

is structured (e.g., Chi, 2006; Feltovich, Prietula, & Ericsson, 2006). Such measures are very different from an ostensible downstream effect of clinical decision-making, such as patient outcome. Additionally, even within the context of therapeutic research, a claim about expertise might be interpreted quite differently given that (a) multiple definitions or measures of "patient outcome" exist, (b) these outcomes often yield different conclusions in treatment outcome research, and (c) there is no "gold standard" by which to distinguish the validity of one outcome relative to another (e.g., Achenbach, 2017; De Los Reyes et al., 2015; De Los Reyes & Kazdin, 2006; De Los Reyes, Thomas, Goodman, & Kundey, 2013). Many cognitive measures of expertise (e.g., the amount of information recalled) do not generally have such levels of ambiguity or multiple interpretations. When we draw from parallel research areas, we must make sure that when terms are shared, they are shared in a deeper conceptual sense. In this way, a challenge in conducting interdisciplinary work is balancing where we should and should not draw parallels to other fields.

Another obstacle in drawing from parallel research traditions is the difference in how research is conducted across disparate fields. Many disciplines outside of clinical psychological science focus on laboratory studies that sacrifice ecological validity for experimental control and therefore internal validity. It may be hard to see how a research paradigm conducted on a computer with an undergraduate sample can inform the demands of the real-world settings in which clinical decisions occur. However, it is useful to question what is necessary to include in a study to inform our understanding of clinical decision-making. For example, can we study laypeople to understand clinical reasoning? Laypeople's mental health reasoning is in itself important to study because laypeople are often the first to try to identify psychological symptoms in themselves or their loved ones (see Marsh and De Los Reyes, in this issue, for further discussion; see also Marsh & Romano, 2016). A separate question is whether laypeople can be used as proxies for studying elements of clinicians' reasoning. After all, clinicians were at one point laypeople who sought to understand or reason about mental health symptoms in others before they received specialized training in clinical decision-making. Studying laypeople, at a minimum, can give us insights into the basic cognitive processes that clinicians may be attempting to modify or "fit" into the tasks they learn through clinical training.

We have highlighted the challenges of drawing analogues from disparate fields and using varied experimental paradigms in studying clinical decision-making. However, drawing from other areas of psychological research does not always pose such challenges. One area of research in particular speaks a common language to clinical psychological science and uses the ecologically valid methods of direct relevance to understanding clinical decisions: research on medical reasoning and decision-making. Physicians and other medical professionals need to gather information from patients, decide on a diagnosis, and construct a treatment plan. Likewise, nonprofessionals must gather symptom information from loved ones and select a treatment or health professional that can assist with medical problems (for a view on this process for laypeople, see Marsh & Romano, 2016). There is a rich tradition in the medical reasoning literature that draws from cognitive science research in categorization (e.g., Brooks, LeBlanc, & Norman, 2000; Papa & Elieson, 1993), judgment and decision-making (e.g., Arkes, Wortmann, Saville, & Harkness, 1981; Chapman et al., 2012; Djulbegovic et al., 2015; Hamm & Zubialde, 1995; Li & Chapman, 2009; Mamede et al., 2010), and expertise (e.g., Boshuizen & Schmidt, 1992; Mylopoulos & Regehr, 2007; Norman, Coblentz, Brooks, & Babcook, 1992; Norman, Eva, Brooks, & Hamstra, 2006; Norman, Young, & Brooks, 2007; Patel, Groen, & Patel, 1997; Schmidt & Boshuizen, 1993). Such research has highlighted that physicians tend to implement a predictable set of cognitive processes when making a diagnosis (Brooks et al., 1991; Hamm & Zubialde, 1995; Hashem, Chi, & Friedman, 2003) and selecting a treatment (Kravitz et al., 2005; Redelmeier & Shafir, 1995; Redelmeier, Tan, & Booth, 1998; Redelmeier & Tversky, 1990; Tentler, Silberman, Paterniti, Kravitz, & Epstein, 2008). Overall, work exploring medical reasoning has provided important insights for all elements involved in medical decision-making.

Despite the extensive work that has been conducted on reasoning about medical decisions, there is almost no cross-talk between medical reasoning researchers and researchers studying the same issues for mental health reasoning. If a researcher is interested in studying the process of diagnosis, why is she not studying it in both medical and mental health professionals? We suggest that researchers have, perhaps unknowingly, accepted a dualistic approach to thinking about health problems, with disorders of the mind being fundamentally different from disorders of the body (for discussions of people as intuitive dualists, see Bloom, 2004; Forstmann & Burgmer, 2015). But is reasoning about patients and diseases in mental health settings fundamentally different from reasoning about patients and diseases in physical health settings? Clinical scientists need to think deeply about this question. If the answer is yes, it would introduce interesting challenges to medical professionals who are often the first health professionals to recognize and treat a mental health

concern (Kessler & Stafford, 2008). In contrast, if reasoning about medical and mental health issues are not fundamentally different, then researchers should begin to interweave these fields to allow the work in medical reasoning to inform research on clinical decision-making in mental healthcare.

Even more generally, we can ask the question, "What do we expect to be distinctive about clinical decision-making that we would not expect to be true of decision-making in other domains of cognition?" As we stated previously, the basic processes of human cognition do not stop working just because a person is thinking in a clinical setting. Any trained mental health professional reasoning about a patient also has experience categorizing and reasoning about problems more generally. Clinicians and clinical researchers often seek to understand patients' cognitive processes, in part because these processes are often implicated in the development and maintenance of patients' mental health concerns (Hunsley & Lee, 2014). Put differently, where clinicians have been quick to see value in understanding the cognitions and decisions of their patients, they may have been slow to see value in understanding the same issues in themselves as practitioners (see Pronin, Lin, & Ross, 2002). Indeed, do we expect clinical and everyday decision-making to differ for good theoretical reasons that stem from the nature of mental disorder categories and the presentation of patient data or merely because we choose to believe that clinical decision-making is somehow special? How the field of clinical psychological science answers this question is of critical importance in our exploration of the interdisciplinary science of clinical decision-making.

We have extolled the importance of importing research approaches from other fields to cross-fertilize the study of clinical decision-making. This is not to say, of course, that this research is not being conducted. For example, Garb (2006) has demonstrated how clinicians' judgments are influenced by well-known cognitive processes such as conjunction errors and the representativeness heuristic (Garb, 1996). He has also provided systematic reviews and discussions of how experience in mental health shapes clinicians' reasoning about mental health problems (Garb, 1989, 1998). Other researchers have explored how experts and laypeople think about clinical problems by using paradigms from categorization research (Ahn, Flanagan, Marsh, & Sanislow, 2006; Cooper & Marsh, 2015; Kim & Ahn, 2002; Marsh & Shanks, 2014), research on causal reasoning (Ahn, Novick, & Kim, 2003; de Kwaadsteniet, Hagmayer, Krol, & Witteman, 2010; Flores, Cobos, López, Godoy, & González-Martín, 2014), and traditional expertise approaches to clinicians' reasoning (Marsh & Ahn, 2012; Witteman & Tollenaar, 2012; Witteman & van den Bercken, 2007). This

Special Section is a testament to the work researchers inside and outside of clinical psychological science are conducting that draws on disparate approaches to understanding clinical decision-making.

The Contribution of This Special Section

Across the papers in this Special Section, the diversity that can develop when approaching clinical decision-making from an interdisciplinary stance becomes apparent. Some of the articles in this Section investigate how symptom information is first processed (Flores, Cobos, & Hagmayer; Marsh & De Los Reyes), others tackle how diagnostic decisions are shaped (Weine & Kim; Youngstrom, Halverson, Youngstrom, Lindhiem, & Findling), whereas still others address how individuals make treatment decisions (de Kwaadstenient & Hagmayer; Hayes). These papers vary in their participants, from highly specialized mental health professionals to laypersons. Finally, the papers range in the tasks used, from computer-based reaction time studies to open-ended diagnosis generation; these tasks in turn vary in their ecological validity relative to actual clinical tasks.

We begin this Special Section with a contribution from Flores, Cobos, and Hagmayer, which explores how people automatically look for causal links among symptoms when first learning of those symptoms. Marsh and De Los Reyes then investigate how the environmental context in which symptoms present themselves influences how they are used as evidence for a diagnosis, even for one that is presumably not linked to environmental influences. Weine and Kim show how the cause from which symptoms arise is taken into account in diagnosis. Hayes demonstrates how using symptoms of a disorder for making treatment decisions influences how category decisions are made. de Kwaadstenient and Hagmayer show how the causal theory of a disorder predicts treatment selection. Finally, Youngstrom et al. reports findings from a study of two large outpatient clinic samples that compares the performance of several different statistical and machine learning models in predicting judgments of whether and which patients received pediatric bipolar disorder diagnoses.

Conclusion

Understanding how people make clinical decisions is crucial for the tens of millions of people experiencing mental health problems around the world (see Layard & Clark, 2014, for a review) and the mental health professionals worldwide trained to deliver care (Kazdin & Blasé, 2011). As it stands, most training programs in clinical psychology and other mental health disciplines do not

Table 1. 10 Essential Readings in Clinical Decision-Making

1. Meehl, P. E. (1954). *Clinical versus statistical prediction: A theoretical analysis and a review of the evidence*. Minneapolis: University of Minnesota Press.
2. Arkes, H. R. (1981). Impediments to accurate clinical judgment and possible ways to minimize their impact. *Journal of Consulting and Clinical Psychology, 49*, 323–330.
3. Wedding, D., & Faust, D. (1989). Clinical judgment and decision making in neuropsychology. *Archives of Clinical Neuropsychology, 4*, 233–265.
4. Dawes, R. M. (1994). *House of cards: Psychology and psychotherapy built on myth*. New York, NY: Free Press.
5. Garb, H. N. (1998). *Studying the clinician: Judgment research and psychological assessment*. Washington, DC: American Psychological Association.
6. Kim, N. S., & Ahn, W. (2002). Clinical psychologists' theory-based representations of mental disorders predict their diagnostic reasoning and memory. *Journal of Experimental Psychology-General, 131*(4), 451–476.
7. Croskerry, P. (2003). The importance of cognitive errors in diagnosis and strategies to minimize them. *Academic Medicine, 78*, 775–780.
8. Gambrill, E. (2006). *Critical thinking in clinical practice: Improving the quality of judgments and decisions*. New York, NY: John Wiley & Sons.
9. Groopman, J. E. (2007). *How doctors think* (Vol. 82). Boston, MA: Houghton Mifflin.
10. Crumlish, N., & Kelly, B. D. (2009). How psychiatrists think. *Advances in Psychiatric Treatment, 15*, 72–79.

provide sufficient emphasis on the basic science of clinical judgment and prediction (Harding, 2007). We encourage researchers, clinicians, instructors, and trainees alike to familiarize themselves with this vast literature, using this Special Section as a starting point. For further reading, we include in this Introduction our "Top Ten" list of classic readings that use or are framed by interdisciplinary approaches to clinical decision-making (Table 1). In looking to other research traditions, we can increase the menu of research and theory for studying clinical decisions and expand our understanding of these decisions.

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The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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