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Theories of Expertise and Measures of Competence: Cognitive and Interactional Perspectives

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Abstract

This symposium explores the relationship between *expertise* and *competence*, two terms used to describe skilled performance. Expertise has long been a foundational topic of inquiry in Cognitive Science (Chi, Glaser, & Farr, 1988; Ericsson, Charness, Feltovich & Hoffman, 2006). Research in this area has produced a much better understanding of how expertise develops at the highest levels of performance (Ericsson et al., 2006). It might seem reasonable that theories of expertise might inform the methods used to assess competence, but it is not clear that this has necessarily been the case. In contradistinction to expertise as studied in Cognitive Science, professional competency is a regulatory matter. Minimal standards of performance are established by certifying bodies and, in professions such as law and medicine, enforced by statute. The relationship between theories of expertise and what measures of competence actually measure has received relatively little attention in the past.

Given its inherent complexity and vital importance to society, much of the research on expertise has been carried out within the domain of medicine (e.g., Patel, Kaufman, & Magder, 1996; Ericsson et al., 2006). Medicine is a highly regulated field and one in which there is a vital need to establish and maintain high standards of practice. State medical boards were established in the U.S. over a century ago to provide “the public a way to enforce basic standards of competence and ethical behavior in their physicians, and physicians a way to protect the integrity of their profession” (FSMB, n.d.). All medical boards require passing scores on the components of a nationally-administered licensing exam. Though most of this exam is based on conventional written tests, one component involves practical problem-

solving. In these tests, applicants work up a series of clinical cases portrayed, for the purposes of the exam, by “standardized patients” (SPs). Applicants interview these patients, perform physical examinations, and document their findings in simulated chart notes. They are evaluated using a combination of behavioral checklists and categorical grades assigned by trained observers (NBME, 2005).

Competence, then, is defined instrumentally as that which the assessments measure—little light is shed on its underlying cognitive and interactional processes. Further, behavioral checklists have been found to imperfectly reflect changing levels of expertise (Hodges et al., 1999). Such checklists would appear, therefore, to lack validity as a metric for professional competence. Though expert evaluators may be able to recognize expert performance when they see it, there are also problems with categorical ratings. Such ratings seek to break down the components of competent performance (e.g., “Questioning skills,” “Information-sharing,” “Professional manner and rapport”), but in the process, may lose the phenomenon of interest. In the clinical exam, the cognitive skills and the interactional work of gathering pertinent information, forming an appropriate clinical picture and communicating findings (both to the patient and fellow healthcare workers) are irremediably interdependent.

The papers to be presented here are all based on a corpus of graded performance samples. These samples are modeled after the practical testing protocols used in high-stakes licensure exams. Each sample includes a video recording of the subject interviewing the SP and conducting a physical exam, the subject’s associated chart note, and a recording of a detailed debriefing interview. These structured samples allow comparisons of performance across different levels of clinical training. Drawing on diverse disciplinary backgrounds, the four presentations

seek to analyze the forms of expertise that underlie competent performance.

The first, to be presented by Colleen Seifert, is entitled, “When is “*too little*” actually “*enough*?”” Her research has focused on the role of memory in problem solving and reasoning (Seifert, 2002; Seifert & Patalano, 2001). Her talk will focus on observations regarding the physicians’ reactions to an impasse in their problem solving. Because the case under study required information not available in the SP encounter, subjects faced an impasse. They had to decide when to stop pursuing more information in the encounter, and recognize that they had elicited as much helpful information as possible. Given the nature of medical evidence—conflicting findings, multiple diagnoses for the same findings, self-report of symptoms—this is critical ability when performing exams.

The second talk, “Clinical Competency as Expertise in Application of Biomedical and Clinical Knowledge in the Clinic,” will be presented by Carl Frederiksen. Studies of clinical expertise require research approaches that can confront the full range and complexity of processes that enable effective functioning in authentic situations of medical practice (Patel, Kaufman, & Magder, 1996). Applying knowledge in clinical situations requires a wide spectrum of cognitive and communicative skills (Frederiksen et al., 2004). Analyzing samples from the shared corpus, Frederiksen has developed a model of expert clinical knowledge and its application that has subsequently been validated using data from subjects at different levels of training.

The third talk, by Brian MacWhinney, will analyze the problem-solving protocols using a conceptual framework borrowed from developmental linguistics. Perspective Theory holds that understanding a sentence corresponds to cognizing a mental model with interlocking entities, properties, and relations (MacWhinney, 2005). It assumes that the successful functioning of a mental model is achieved by operating this device from the viewpoint of an embodied agent. Using this model, Greeno & MacWhinney (2007) showed how classroom learning events involve perspective shifts between competing mechanistic models. The emergent clinical pictures developed within each assessment protocol evidence similar shifts in perspective.

Operating within a more sociological tradition, Goodwin (1994) analyzed “professional vision” by examining the discursive methods through which members of a profession highlight objects of interest. In the final talk, Timothy Koschmann will apply a similar analysis to the transcripts of expert evaluators assigning grades to subjects’ performances. He will document how a performance is rendered visible as competent through the evaluators’ discursive practices.

Ted Shortliffe serves as the panel discussant. In addition to being a practicing physician, Shortliffe was the developer of one of the first medical expert systems. In this way, he broadens the set of perspectives examining the relationship between expertise and competency.

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