

## EMERGENCE OF THE HUMAN CAPITAL RESOURCE: A MULTILEVEL MODEL

ROBERT E. PLOYHART  
THOMAS P. MOLITERNO  
University of South Carolina

This article offers a new approach to the conceptualization of the human capital resource by developing a multilevel model connecting micro, intermediate, and macro levels of scholarship. We define human capital as a unit-level resource that is created from the emergence of individuals' knowledge, skills, abilities, or other characteristics. The model provides new insights into how strategically valuable human capital resources have their origins in the psychological attributes of individuals and are transformed through unit-level processes.

Scholarly thought regarding the importance of the human capital resource has a long tradition. Beginning with Adam Smith's identification of "the acquired and useful abilities" of individuals as a source of "revenue or profit" (1963/1776: 213–214), there is a widely acknowledged sense that individuals possess a stock of skills, knowledge, and experiences that can be leveraged for organizational and/or personal benefit. Building on this fundamental insight, scholars working in disciplinary traditions ranging from psychology (Spearman, 1927) to economics (Becker, 1964) have developed the human capital construct. In the realm of management research, *microlevel* scholars working in the human resources (HR), organizational behavior (OB), and industrial/organizational (I/O) psychology domains, who are generally interested in individual-level phenomena, have largely studied how employee knowledge, skills, abilities, and other characteristics (KSAs) are linked to individual-level outcomes (e.g., Schmidt & Hunter, 1998). At the other end of the spectrum, *macrolevel* organizational theorists and strategy scholars, who are generally interested in firm-level phenomena, have studied how the aggregate organizational-level experience, education, and

skills of employees are resources (Penrose, 1959; Rumelt, 1984; Teece, 1982; Wernerfelt, 1984) that can be leveraged to achieve sustainable competitive advantage (Barney, 1991; Peteraf, 1993).

Yet despite the prominence of the human capital construct in both microlevel and macrolevel scholarship, and despite great theoretical and methodological sophistication *within* both disciplines and levels, there is little understanding about how human capital manifests across organizational levels. If one defines "multilevel" as theory that speaks to the connection that *integrates* two or more levels (Kozlowski & Klein, 2000), then there is no fully articulated multilevel theory describing *how the human capital resource is created and transformed across organizational levels*. While the recent strategic HR management (SHRM) literature (e.g., Liao & Chuang, 2004; Nishii, Lepak, & Schneider, 2008; Takeuchi, Lepak, Heli, & Takeuchi, 2007; Wright & Boswell, 2002) in some ways fills the void between the micro and macro approaches to human capital by adopting multilevel principles, it focuses primarily on the organizational practices that leverage individual human resources and does not focus as much theoretical attention on *how* human capital resources are created (for critiques see Gerhart, 2005; Lepak, Liao, Chung, & Harden, 2006; Wright & Haggerty, 2005).

This paper addresses this theoretical void and proposes a multilevel model of human capital creation. To this end we define human capital as

---

We thank associate editor David Lepak and three anonymous reviewers for comments and feedback that not only improved the manuscript but truly shaped, refined, and focused our arguments. We are indebted to them for their input. We also thank Anthony Nyberg for commenting on previous versions of this manuscript and Steve Kozlowski for many helpful conversations relating to this paper.

a unit-level<sup>1</sup> resource that is created from the emergence of individuals' knowledge, skills, abilities, and other characteristics (KSAOs). Central to this definition and the multilevel model we develop is the process of emergence. Kozlowski and Klein describe "a phenomenon [as] emergent when it originates in the cognition, affect, behaviors, or other characteristics of individuals, is amplified by their interactions, and manifests as a higher-level, collective phenomenon" (2000: 55). In this way the model we propose articulates the full multilevel process of human capital resource emergence: the "collective" unit-level human capital resource "originates" in individual-level employee KSAOs. Most important, however, is the mechanism whereby the individual-level KSAOs are transformed and "amplified" to become a valuable unit-level resource. To explicate this process we draw on the groups literature and teams literature (e.g., Kozlowski & Ilgen, 2006) to describe a new mechanism—the "emergence enabling process"—that is the driver of this transformative process. In describing the mechanism whereby individual-level KSAOs become unit-level human capital resources, the emergence enabling process is the missing piece in the puzzle connecting micro and macro human capital scholarship.

The multilevel model of human capital emergence has many broad implications that both develop and challenge prevailing thinking regarding human capital. First, the model addresses limitations in the existing body of human capital literature both by articulating how individual-level KSAOs become a strategically valuable resource (typically neglected in microlevel research) and by explaining how unit-level human capital resources are created (typically neglected in macrolevel research). Second, in demonstrating how organizations create the valuable human capital resource by bundling individual-level KSAOs, we shed light on the microfoundations (Abell, Felin, & Foss,

2008; Felin & Hesterly, 2007; Lepak et al., 2006; Teece, 2007) of an important organizational dynamic capability (Eisenhardt & Martin, 2000; Helfat et al., 2007; Teece, Pisano, & Shuen, 1997). Third, because we explain how human capital originates from the aggregation of individual-level employee KSAOs, we broaden the conceptualization of the unit-level human capital resource. Thus, our overarching contribution is a multilevel model of human capital emergence that not only integrates the macro and micro perspectives to yield a more theoretically complete picture of human capital's foundations, creation, and content but also challenges conventional thinking on human capital and raises many questions requiring theoretical attention.

## MULTILEVEL THEORY AND HUMAN CAPITAL RESEARCH

### Overview of Multilevel Theory

Multilevel theory is concerned with understanding how constructs and processes are related across levels of analysis (e.g., individual and firm). As Kozlowski and Klein note, "Multilevel theory building presents a substantial challenge to organizational scholars trained, for the most part, to 'think micro' or to 'think macro' but not to 'think micro and macro'—not, that is, to 'think multilevel'" (2000: 11). In making the linkage between organizational levels, Kozlowski and Klein (2000) identify three major guiding principles that are central to both our evaluation of the existing human capital literature and the model we propose in this paper. First, multilevel scholarship makes a distinction between the *level of theory* and the *level of measurement*. The level of theory represents the level (e.g., individual, firm, business unit, etc.) at which a construct or process is expected to operate or exist, whereas the level of measurement represents the level at which the construct or process is measured.

Second, multilevel research is concerned with *emergence*—the processes explaining how and why phenomena at lower levels coalesce to create a higher-level construct that is distinct from its lower-level origins. The end result of this process leads to different forms of emergence, ranging from *composition* (e.g., higher-level phenomena created through the *homogeneity* of lower-level phenomena) to *compilation* (e.g.,

<sup>1</sup> We use the term *unit level* to refer generically to the organizational level of interest. Thus, "unit level" might refer to the firm, business unit, division, group, or team level of analysis. Since the model of human capital resource emergence can apply to different organizational levels of aggregation, we opt for the more inclusive *unit level* term to identify the level in which researchers have theoretical interest.

higher-level phenomena created through *heterogeneity* of lower-level phenomena). Emergence does not imply higher-level phenomena are more or less complex than lower-level phenomena. Further, a sole focus on the end states of composition or compilation fails to recognize the theoretical explication of mechanisms driving emergence. Instead, the goal of multilevel research is to explain the underlying theoretical process that creates emergent phenomena. In this way, the goal of this paper is to explain the theoretical process of human capital resource emergence.

Finally, scholars have argued that ignoring these multilevel issues may lead to a number of fallacious interpretations (Kozlowski & Klein, 2000; Rousseau, 1985). These fallacies include (1) misattributing the level of theory for a construct (e.g., assessing employee competencies at the firm level; Gerhart, 2005), (2) ignoring the effects of context (e.g., not realizing that the value of KSAOs is affected by the firm's strategy; Barney, 1991), and/or (3) assuming that the findings from one level apply to other levels (e.g., believing that hiring better employees always contributes to firm effectiveness; Ployhart, 2004).

### Single-Level Human Capital Research

Armed with even this admittedly brief overview of multilevel theory, one can observe that the majority of human capital research has taken a single-level approach (Hitt, Beamish, Jackson, & Mathieu, 2008; Wright & Boswell, 2002). Not surprisingly, differences in the micro literature and macro literature on human capital correspond to differences in the undergirding scholarly disciplines. The micro perspective is generally found in the HR literature, OB literature, and I/O literature, and it draws mainly from psychology (e.g., Spearman, 1927) or economics (e.g., human capital theory; Becker, 1964). Microlevel scholars define human capital largely in terms of individual differences in KSAOs (e.g., general intelligence, personality). These individual KSAOs are, in turn, linked to individual-level outcomes (e.g., performance, turnover; Wright & Boswell, 2002). Empirically, micro scholarship tends to measure broad and context-generic individual KSAOs (e.g., cognitive ability, personality) directly by administering tests of these constructs.

In contrast, the macro perspective is articulated in the strategy literature and organizational theory literature, which focus primarily on human capital as a unit-level resource that can contribute to sustained competitive advantage (Coff, 1997, 1999; Mahoney & Pandian, 1992; Wright, McMahan, & McWilliams, 1994). Macro scholarship emphasizes the context- or firm-specific nature of the human capital resource (e.g., Coff, 2002; Felin & Hesterly, 2007; Hitt, Bierman, Shimizu, & Kochhar, 2001). Work in this tradition tends to study human capital at the unit level and to equate it with the aggregate knowledge, skill, or experience in the organization. In macro research these conceptualizations of human capital are frequently measured with managerial self-reports (e.g., Hatch & Dyer, 2004; Wiklund & Shepherd, 2003), proxy measures (e.g., Hitt et al., 2001), or counts of theoretically desirable human resources (e.g., Kor & Leblebici, 2005).

Thus, both the micro and macro human capital literature are largely single level (individual or unit), and within each literature the level of theory and level of measurement have generally been conceptualized at the same level of organizational analysis. This single-level perspective so dominates both approaches that they offer little guidance for each other (Wright & Boswell, 2002). Our purpose is not to criticize this prior research—indeed, it has generated many important insights. Rather, we only note that management scholars are left with a piecemeal and incomplete understanding of the human capital resource's foundations, creation, and content across organizational levels. Both the microlevel literature and macrolevel literature have contended with the shortcomings inherent in their single-level approaches by adopting a host of assumptions. Unfortunately, these cross-level assumptions may not be warranted and could very well be multilevel fallacies (Klein, Dansereau, & Hall, 1994; Rousseau, 1985; Simon, 1973). We suggest four areas where this deficiency is manifest (Table 1).

First, the microlevel literature says little about *how* individual KSAOs lead to firm performance. Here, researchers assume that a relationship between individual KSAOs and unit-level performance exists, but there is little theory to directly support this association (Harris, 1994; Schneider, Smith, & Sipe, 2000). Moreover, the microlevel literature says very little about the mechanisms

**TABLE 1**  
**Prototypical Characteristics and Key Assumptions of Micro and Macro Human Capital Research**

Level of Theory	Disciplinary Tradition	Key Assumptions	Potential Multilevel Fallacies <sup>a</sup>
Micro (HR, OB, I/O psychology)	Differential psychology	<ul style="list-style-type: none"> <li>● Assumption 1: Individual differences affect the firm. More is better, so firms with more talented employees will outperform firms with less talented employees (there are no diminishing returns on talent).</li> <li>● Assumption 2: Some KSAOs are always valuable. Overall cognitive ability and conscientiousness are valuable and important for all jobs.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Cross-level fallacy</b> by assuming individual-level findings generalize to the firm level</li> <li>● <b>Contextual fallacy</b> by ignoring macro findings showing that the value of human capital resources is context specific; <b>cross-level fallacy</b> by assuming individual-level findings generalize to the firm level</li> </ul>
Macro (strategy)	Economics	<ul style="list-style-type: none"> <li>● Assumption 3: Human capital is composed of knowledge, skill, experience, and/or education.</li> <li>● Assumption 4: Human capital exists at the firm (or unit) level and can be measured at that level (i.e., there is little attempt to theorize or test whether and how aggregating individual KSAOs to create firm-level human capital is warranted).</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Cross-level fallacy</b> by ignoring the many cognitive and noncognitive variations of individual differences found in the micro literature</li> <li>● <b>Misspecification fallacy</b> by neglecting to consider how individual-level KSAOs emerge to form a new unit-level human capital construct; <b>cross-level fallacy</b> by assuming firm-level measures of human capital adequately represent the KSAOs of employees and by assuming all employees within the firm manifest identical human capital scores</li> </ul>

<sup>a</sup> Our labeling of these fallacies is from Rousseau (1985).

driving the relationship between individual KSAOs and unit-level performance.

Second, and relatedly, the micro literature adopts a "universalistic" perspective: KSAOs such as cognitive ability and personality are expected to relate positively to individual performance across most occupations and contexts (Schmidt & Hunter, 1998). The consequence is a "more is better" approach, assuming that if a KSAO is related to an individual's performance on the job, then greater aggregations of that KSAO will add value to the firm (Schmidt & Hunter, 1998). Paradoxically, the macrolevel literature suggests this is unlikely to be true and adopts a contingency approach to the value of human capital resources (Barney, 2001). That is, human capital is only thought to be a valuable resource that contributes to unit-level performance and associated competitive advantage (Barney, 1991) when it is relatively unit specific (Barney & Wright, 1998).

Third, the macro literature generally recognizes only a very narrow range of individual-level attributes as a relevant source of human

capital—namely, unit-specific skill, experience, and knowledge. Yet such a perspective ignores the rigorous research on individual differences conducted at the micro level (e.g., cognitive and noncognitive KSAOs).

Finally, notwithstanding the first steps at understanding the "microfoundations" of strategy (Felin & Hesterly, 2007; Teece, 2007), the macrolevel literature assumes it is possible to measure human capital at the unit level with proxies, rather than assess attributes of individual employees directly. Consequently, this literature says little about where the human capital resource originates, how it is created, and how it is transformed.

### The Strategic Value of Creating Human Capital Resources

It is important to pause and ask a fundamental question: Why, from an organizational perspective, is it important to develop a multilevel model describing how unit-level human capital is created? The answer to this question rests in

the resource-based view (RBV) of the firm (Grant, 1991; Penrose, 1959; Rumelt, 1984; Teece, 1982; Wernerfelt, 1984), which argues that the firm's resources can be a source of competitive advantage (Barney, 1991; Mahoney & Pandian, 1992) and economic value creation through the generation of sustainable rents (Barney, 1986; Lippman & Rumelt, 2003; Mahoney, 2001; Peteraf, 1993). This perspective has been applied to human capital in particular (Barney & Wright, 1998; Boudreau & Ramstad, 2005; Wright, Dunford, & Snell, 2001; Wright et al., 1994). Taken together, this body of research suggests that human capital is a particular class of resource that can be a significant driver of unit-level performance. Moreover, the firm's relative competency in managing its resources should likewise be a driver of competitive advantage (Mahoney, 1995; Makadok, 2001; Sirmon, Hitt, & Ireland, 2007).

Shifting our theoretical focus from human capital as a resource that the organization possesses to the process through which human capital resource emerges from individual KSAOs, we draw on theoretical insights from two streams in the recent macrolevel scholarly literature. First, a number of scholars have noted that a full understanding of macrolevel constructs requires an understanding of their "microfoundations" or "subsystems" (Abell et al., 2008; Felin & Hesterly, 2007; Teece, 2007; and see Wright et al., 2001, for related points). Work in this area shows that firm-level theoretical constructs and phenomena are created and shaped by lower-level psychological and behavioral mechanisms. Inasmuch as the RBV is a central theoretical perspective on firm-level competitive advantage, the definition of human capital that we have offered—which identifies the origins of unit-level human capital resource in individual-level KSAOs—aligns with, and is partly motivated by, scholarship on microfoundations.

Second, researchers developing the dynamic capabilities view (DCV) of the firm (Eisenhardt & Martin, 2000; Helfat et al., 2007; Teece, 2007; Teece et al., 1997) have defined dynamic capabilities as "the capacity of [the] organization to purposefully create, extend, or modify its resource base" (Helfat et al., 2007: 4), and scholars have successfully leveraged the DCV with respect to human resources (Wright et al., 2001; Wright & Snell, 1998). A central proposition of

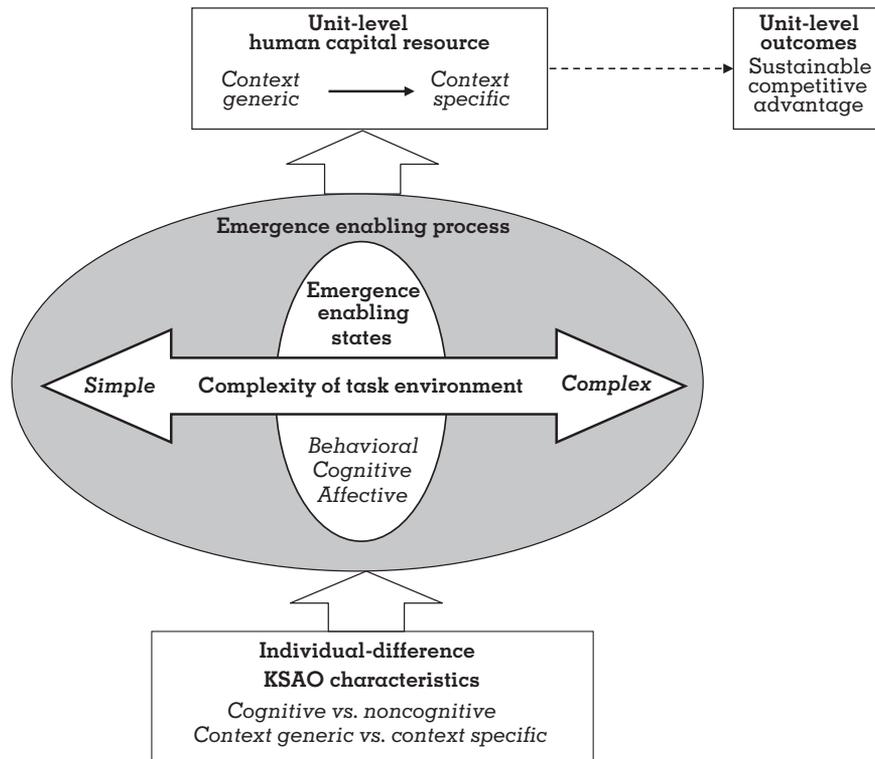
the DCV perspective is that the organization's resource base and the processes through which it is created change in response to environmental changes (Eisenhardt & Martin, 2000; Maritan & Peteraf, 2007; Teece, 2007). This conceptual insight directly implies that the nature of the organization's task—how and why the organization manages resources the way it does—is motivated by the environmental context in which the organization operates (Barney, 2001). Succinctly put, organizations "create great value by assembling particular constellations of assets inside an enterprise . . . [to] produce . . . goods and services that consumers want" (Helfat et al., 2007: 23). This idea is at the core of the model we develop next: the emergence of human capital is a process of "assembling" a valuable unit-level resource. Thus, we essentially parameterize the microfoundations of an important dynamic capability.

#### A MULTILEVEL MODEL OF HUMAN CAPITAL RESOURCE EMERGENCE

We have defined human capital as a unit-level resource that is created from the emergence of individuals' KSAOs, and we depict the multilevel model of human capital resource emergence in Figure 1. It is important to recognize at the outset that the model and definition deviate substantially from existing human capital theory and research. Unlike prior microlevel and macrolevel research assuming relationships at one level generalize to other levels, our model and definition explicate the nature of these cross-level relationships to explain how human capital resources are created and emerge from lower-level KSAO origins. Indeed, the definition of human capital resources explicitly recognizes its cross-level and emergent nature.

Recalling that Kozlowski and Klein describe "a phenomenon [as] emergent when it originates in the cognition, affect, behaviors, or other characteristics of individuals, is amplified by their interactions, and manifests as a higher-level, collective phenomenon" (2000: 55), we organize our discussion of the multilevel model of human capital emergence into three parts. First, we draw from the work of differential psychology to define the *origins* of human capital (i.e., the KSAO box at the bottom of Figure 1). These

**FIGURE 1**  
**The Multilevel Model of Human Capital Resource Emergence**



KSAOs include both generic and specific forms, representing cognitive and noncognitive domains. Second, we illuminate how KSAOs are combined and *amplified* by integrating theoretical processes described in the scholarship on groups and teams, which describes the “complex dynamic systems that exist in a context, develop as members interact over time, and evolve and adapt as situational demands unfold” (Kozlowski & Ilgen, 2006: 78). Central to this part of the model (the center of Figure 1) is the emergence enabling process, which comprises the complexity of the unit’s task environment and emergence enabling states. Third, we consider the nature of the *collective* unit-level human capital resource that emerges as a function of these amplifying processes. As described above, this resource can be a source of competitive advantage under certain conditions (Wright et al., 1994), but the process of emergence we describe suggests that existing macrolevel conceptualizations of the content of “valuable” human capital resources may be overly narrow.

#### Origins of Human Capital Resources: Individual-Difference KSAOs

We begin with the conceptually simplest, but perhaps theoretically most significant, component of the model. We have defined the human capital resource as originating in the individual-level KSAOs of employees who make up the unit. Therefore, the roots of human capital lie at the individual level and exist in the full range of employees’ KSAOs (bottom of Figure 1). This is, of course, the assumption of most of the macrolevel research we outlined above, but the model we describe draws on the considerable microlevel research that parameterizes and validates this assumption.

Conceptually, this observation is consistent with the current “microfoundations project” in the strategic management literature, which argues that “substantial attention be paid to explanatory mechanisms that are located at the . . . level of individual action and (strategic) interaction” (Abell et al., 2008: 489). This recent theoretical stream has suggested that we can gain trac-

tion by moving past the firm—or “collectivist”—level of analysis when considering value creation and competitive advantage and focusing instead on “the role individuals play” (Felin & Hesterly, 2007: 212; see also Fulmer, Gerhart, & Scott, 2003; Gerhart, 2005; Lepak, Smith, & Taylor, 2007; Schneider, 1987). In this way, by focusing on the individual-level KSAOs that lie at the foundation of the unit-level human capital resource, our model aligns with this effort to provide greater insight into where valuable organizational resources originate and how they are constructed. While microlevel scholars may find this “development” in the macro literature obvious, it is important to note that when modeling aggregate constructs, macrolevel research generally favors unit-level proxies over individual-level parameterizations, which Newbert (2007) suggests has been driven by the relative ease of the associated data collection (see Felin & Hesterly, 2007, for a related and thoughtful discussion).

Thus, extending the work of Wright et al. (1994), we propose that human capital has its origins in the full range of individual-level KSAOs. Any serious study of human capital must understand the KSAOs of the employees in question. To understand how different this conceptualization of human capital’s origins might be for scholars working in the macro tradition, consider three examples: Pennings, Lee, and van Witteloostuijn (1998) employ firm-level averages of organizational and industry tenure as proxies of human capital in a study of organizational survival among Dutch accounting firms; Westhead, Wright, and Ucbasaran (2001) operationalize gender, cultural background, and educational level as measures of an entrepreneur’s human capital; and Hatch and Dyer (2004) rely on *managerial estimations* of the organization’s human capital endowment. Proposition 1, then, is extremely consequential, particularly in the context of the existing body of macrolevel human capital research. Fully understanding human capital—including its microfoundations—requires an integration of psychological research on individual-difference KSAOs.

*Proposition 1: The origins of human capital resources exist in the full range of KSAOs of employees within the unit.*

Because human capital resources originate in the KSAOs of individuals, one must necessarily begin with an understanding of those individual KSAOs. There is a large body of psychological literature on individual KSAOs, over a century old, comprising many distinctions and types of KSAOs. As a means of summarizing this extensive literature, we compare and contrast the content of individual-difference KSAOs in terms of whether they are (1) cognitive versus noncognitive and (2) context generic versus context specific (Ackerman, 1996; Ackerman & Heggstad, 1997; Lubinski, 2000; Schmitt, Cortina, Ingerick, & Wiechmann, 2003). To facilitate application of these ideas to the model we describe, Table 2 provides an overview and summary of the content of individual KSAOs.

The first distinction, between cognitive and noncognitive KSAOs, recognizes the long-known difference between what a person “can do” (cognitive KSAOs) and what a person “will do” (noncognitive KSAOs; Cronbach, 1949). Of the four major types of cognitive KSAOs—general cognitive ability, knowledge, skills, and experience—most microlevel research has focused on general cognitive ability because it is the strongest predictor of educational attainment and success, job performance, promotion rates, and salary (Carroll, 1993; Gottfredson, 1997; Jensen, 1998; Schmidt & Hunter, 1998). Importantly, those with greater general cognitive ability learn faster, benefit more from experience, and acquire knowledge more quickly and deeply (Jensen, 1998). Of the four cognitive KSAOs, only general cognitive ability is *stable* throughout adulthood and, hence, is not affected by advanced education or experience.

The three types of noncognitive KSAOs—personality, values, and interests (see Kanfer, 1990)—comprise such personal characteristics as conscientiousness and preferences for different educational majors and professional occupations. Noncognitive KSAOs are stable through adulthood (Kanfer, 1990) and, as a result, exert a lifelong impact on the types of situations and experiences one chooses to engage in and the kinds of social relationships one develops and maintains.

The second distinction, between context-generic and context-specific-KSAOs, recognizes that KSAOs differ in terms of their malleability and context specificity. This is not unlike the distinction in macrolevel research between

**TABLE 2**  
**Individual-Difference KSAO Domains**

Cognitive KSAOs ("Can Do")	Noncognitive KSAOs ("Will Do")
<ul style="list-style-type: none"> <li>● <i>General cognitive ability</i> (general mental ability, intelligence, or <i>g</i>) represents KSAOs that involve the comprehension, manipulation, retention, and creation of information (Jensen, 1998). It is relatively stable throughout adulthood and the strongest predictor of educational and occupational outcomes (Carroll, 1993; Gottfredson, 1997; Jensen, 1998; Schmidt &amp; Hunter, 1998).</li> <li>● <i>Knowledge</i> is an understanding of principles, facts, and processes. Knowledge can range from generic to specific (e.g., knowledge of accounting to knowledge of how to use a particular firm's accounting software). It is usually clustered within domains such as those learned through formal education (e.g., accounting) and/or experience.</li> <li>● <i>Skills</i> represent a capacity to learn more information or learn information more quickly (e.g., study skills, reading skills). They are tied to generic domains reflecting much of what is learned through formal education or experience (e.g., problem solving, social interactions).</li> <li>● <i>Experience</i> is a multifaceted construct that reflects an opportunity to learn and transfer knowledge from generic to job and firm specific. There are multiple types of experience (e.g., job, firm) that vary in terms of amount, time, and type (Quinones, Ford, &amp; Teachout, 1995).</li> </ul>	<ul style="list-style-type: none"> <li>● <i>Personality</i> refers to a set of traits, generally stable throughout adulthood, that direct and maintain consistency in behavior. The Five Factor Model (FFM) of personality (McCrae &amp; Costa, 1996) is dominant and includes <i>emotional stability</i> (resistance to anxiety and stress), <i>extraversion</i> (dominance, social striving), <i>openness to experience</i> (desire to learn and experience new things), <i>agreeableness</i> (empathy and desire to get along with others), and <i>conscientiousness</i> (dependability, achievement, reliability).</li> <li>● <i>Interests and values</i> are stable throughout adulthood and represent an individual's preferences for certain types of work. The best example of this individual-level noncognitive attribute is Holland's RIASEC model (1997), which notes that people choose occupations that fit their interests and values.</li> </ul>

firm-specific and generic human capital resources (Barney & Wright, 1998; Hatch & Dyer, 2004), except that in micro research many different types of KSAOs (i.e., beyond knowledge) are considered as having relatively more or less context specificity. Cognitive ability, personality, values, and interests are context-generic KSAOs because they are relatively stable and endure across time and situations (Jensen, 1998; Kanfer, 1990); hence, they are determinants of performance in many different tasks and firms (Barrick & Mount, 1991; Schmidt & Hunter, 1998). Skills may be context generic when they are tied to broad domains (e.g., social skills) or context specific when they are tied to narrow domains (e.g., skill in navigating a firm's political nuances). Knowledge and experience may also be either context generic (e.g., knowledge of accounting principles) or context specific (e.g., knowledge of a client's specific accounting situation).

Given this fundamental variation in the nature of KSAOs, it is erroneous and potentially misleading to refer to the human capital resource as if all types of human capital were the

same. Rather, human capital should be defined in terms of content (cognitive human capital versus noncognitive human capital) and specificity (context-generic human capital versus context-specific human capital). These observations suggest that prior macrolevel research on human capital, which emphasizes firm-specific experience, skills, and knowledge, has considered too narrow a range of human capital content: the human capital resource can emerge from the aggregation of a much broader array of individual-level KSAOs. Consequently, the nature of the unit-level human capital resource is much more multifaceted, and, as a result, theory building and empirical testing can become more precise.

*Proposition 2: The content of human capital resources may be cognitive (general cognitive ability, knowledge, skills, and experience) or noncognitive (personality, values, and interests) and context generic or context specific.*

Proposing that the human capital resource originates in the KSAOs of individual employees does not mean that the unit-level human capital resource is identical, conceptually or empirically, to those individual KSAOs. In multilevel theory the term *isomorphism* is used to describe those situations where higher- and lower-level constructs share some common features yet are conceptually and empirically distinct (Chan, 1998). It is extremely rare for higher- and lower-level constructs to be perfectly isomorphic; rather, *partial isomorphism* is the norm (see Chan, 1998, and Kozlowski & Klein, 2000).

We propose that individual KSAOs and human capital resources will likewise be partially isomorphic. To understand why, it is necessary to recognize that the determinants that create the human capital resource are different from the determinants that create KSAOs. The determinants of individual KSAOs are largely genetics and the person's environment (Lubinski, 2000), whereas the determinants of human capital resources are contextual in nature. A simple example helps illustrate the point. Consider how the cognitive ability of a given employee is largely determined by early childhood environment and genetics (Jensen, 1998). However, at the unit level the human capital resource is constructed and reconstructed via the repeated aggregation (e.g., staffing and turnover cycles) of employees with relatively fixed levels of cognitive ability (Hatch & Dyer, 2004). As a result, while one individual's cognitive ability does not change, a unit's cognitive ability human capital will change over time. More generally, human capital resources are changeable and malleable because they are based on the aggregations of individual KSAOs, whereas individual KSAOs may or may not be changeable and malleable. The consequences of this insight are fundamental to the model because they suggest that researchers cannot assume that findings from one level generalize to other levels.

What, then, occurs during the emergence process that results in a unit-level human capital resource that is only partially isomorphic with the individual-level KSAOs from which it originates? Bliese calls the process through which partial isomorphism occurs "fuzzy composition," noting that "the main difference between a lower-level and an aggregate-level variable in fuzzy composition models is that the aggregate variable contains higher-level *contextual influ-*

*ences that are not captured by the lower-level construct*" (2000: 369–370; emphasis added). Thus, the notion of contextual influences on the emergent human capital resource provides the answer to the question of why partial isomorphism occurs. In the next section we introduce the *emergence enabling process* as the locus of the intermediary mechanisms that result in an emergent unit-level human capital resource that is partially isomorphic with the individual-level KSAOs at its origins.

*Proposition 3: Human capital resources and individual KSAOs are partially isomorphic because they have different antecedents.*

### **Amplification of KSAO Content: The Emergence Enabling Process**

We now turn our attention to the question of how individual KSAOs are "amplified by their interactions" (Kozlowski & Klein, 2000: 55). We propose that the emergence enabling process is the means by which individual KSAOs are transformed into valuable unit-level human resources. This process consists of a relationship between two interrelated components (center of Figure 1). The first component is the complexity of the unit's *task environment*, or the degree to which the unit's tasks require interdependence and coordination among members. While this relates to the dynamism of the environmental context in which the unit operates (Eisenhart & Martin, 2000), we conceptualize the complexity of the unit's internal task environment as consisting of four dimensions: temporal pacing, dynamism of the task environment, strength of member linkages, and workflow structure (Bell & Kozlowski, 2002). The second component comprises the unit's *emergence enabling states* and consists of the unit's behavioral processes, cognitive mechanisms, and affective psychological states (Kozlowski & Ilgen, 2006). Simply put, emergence enabling states describe how unit members act, think, and feel.

This part of the model recognizes the importance on human capital emergence of both demands in the task environment (task complexity) and social/psychological processes and states (emergence enabling states) that are mobilized to respond to those task demands. The two components are interrelated. The complexity of the

task environment influences the nature of the behavioral, cognitive, and affective emergence enabling states (Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Kozlowski & Bell, 2003; Kozlowski & Ilgen, 2006; Marks, Mathieu, & Zaccaro, 2001), but, as we will discuss, over time the emergence enabling states can also influence how the tasks are structured.

**Complexity of the task environment.** The first component of the emergence enabling process concerns the overarching complexity of the unit's task environment.<sup>2</sup> The literature on workgroups and teams (for comprehensive reviews see Ilgen et al., 2005, and Kozlowski & Ilgen, 2006) has identified how "team members combine their individual resources, coordinating knowledge, skill, and effort to resolve task demands" (Kozlowski & Ilgen, 2006: 81). It has long been recognized that collective phenomena emerge in team settings because the nature of the team's tasks and workflow requires team member coordination, interdependence, and interaction (see Bell & Kozlowski, 2002; Marks et al., 2001; McGrath, 1984; Steiner, 1972; Thompson, 1967; Van de Ven, Delbecq, & Koenig, 1976). Accordingly, we draw on insights from the teams literature to consider how four distinct dimensions of unit task complexity affect the emergence of unit-level human capital resources from individual-level KSAOs.

The first dimension of task complexity concerns the *temporal pacing* of unit members as they perform their various tasks (Fleishman & Zaccaro, 1992; Marks et al., 2001). Asynchronous pacing means that unit members complete their tasks at different points in time (e.g., sharing information over email), whereas synchronous pacing means that unit members must coordinate their behavior to perform the task (e.g., face-to-face interaction). The second dimension captures the *dynamism of the task environment*. Static environments mean the tasks are stable and relatively unchanging, whereas dynamic environments are highly fluid and marked by change and uncertainty (Kozlowski, Gully, Nason, & Smith, 1999). Importantly, the dynamism

of the task environment impacts processes embedded in organizational resource creation and reconfiguration (Eisenhardt & Martin, 2000; Teece, 2007). The third dimension of task complexity is the *strength of member linkages* within the unit. Weak linkages mean that there is little need for unit members to know or communicate with each other, whereas strong linkages mean unit members have detailed and rich interactions and hold intricate information and knowledge of each other (Ancona & Chong, 1996).

The fourth dimension of task complexity concerns the unit's *workflow structure*. There are four basic forms for the unit's workflow structure—pooled, sequential, reciprocal, and intensive (Bell & Kozlowski, 2002; Van de Ven et al., 1976)—that align with increasing levels of temporal pacing, environmental dynamism, and strength of member linkages. *Pooled* workflow structures are based on the simple addition of individual team members' inputs. The unit task environment is static, workflow pacing among individuals is asynchronous, and linkages among employees are weak. An example is a tug-of-war contest where every member must only pull in the same direction. *Sequential* workflow structures require temporal sequencing of unit member interactions such that one member's output becomes the next member's input (i.e., unidirectional linkages among unit members). A simple example is fast food restaurants where employees working different functions (e.g., staffing the cash register, grill, fry station, and drink fountain) must work collaboratively, but sequentially, to service customers in an efficient and quality manner (Kacmar, Andrews, Rooy, Steilberg, & Cerone, 2006). *Reciprocal* workforce structures build from sequential, but the flow of inputs and outputs can go forward or backward. The task environment is more dynamic since the workflow is bidirectional, creating stronger linkages among employees. A familiar example of a reciprocal structure is coauthors who iteratively pass drafts of a manuscript back and forth to each other. Finally, *intensive* workflow structures require the greatest amount of synchronization, pacing, and coordination. Here team members work simultaneously, collaboratively, and interactively and must adapt to each other's behavior. The task environment is also dynamic, and the workflow requires multidirectional linkages among em-

<sup>2</sup> Hereafter, we refer to the complexity of the unit's task environment more simply as *task complexity*. We do so only for the sake of brevity but emphasize that units often perform multiple tasks and so the term *task complexity* should be treated as a comprehensive view of the complexity of the unit's task environment.

ployees. An example is an emergency room medical team providing trauma care on a patient.

Together, these four dimensions create a continuum of unit task complexity. Simple unit tasks require little need to synchronize member interactions, the task environment is static, the linkages among team members are weak, and the workflow is pooled. At the other end of the continuum, complex team tasks create intensive workflows and require close temporal synchronization where members must carefully pace their actions with other team members, adjust their behaviors to those of other members, and operate in a dynamic task environment. The linkages among team members are strong and result in considerable shared information.

The four dimensions of the unit's task complexity are expected to directly influence which specific KSAOs may emerge into a human capital resource. For example, the task complexity of customer service in a retail discount store is lower than the task complexity of a top management team (e.g., sequential versus intensive workflows). Therefore, given the nature of the task demands, human capital resource emergence may be primarily limited to noncognitive KSAOs in the retail organization (Ployhart, Weekley, & Ramsey, 2009), whereas human capital resource emergence may occur for both cognitive and noncognitive KSAOs in the top management team (Hambrick & Mason, 1984; Wiersema & Bantel, 1992). Likewise, the task complexity for retail employees may require shared knowledge while the task complexity for a top management team will require both shared knowledge and distributed expertise.

It is noteworthy that as task complexity within the emergence enabling process increases, so does the inimitability (Barney, 1991) and, thus, the unit-level value of the emergent human capital resource. Drawing on seminal insights by Dierickx and Cool (1989), we observe first that increasing task complexity increases the path dependency within emergence processes. Second, the social complexity of the human capital resource increases as the linkages among employees become stronger and more synchronized. Finally, causal ambiguity increases with task complexity because the relationships and linkages among employees and resources become more bidirectional and multiplicative.

However, to fully understand the influence of unit task complexity on the emergence of valuable human capital resources, we must consider the second component of the emergence enabling process—namely, the emergence enabling states. This is because the unit's task complexity influences the form of human capital resource emergence via its influence on the unit's behavioral, cognitive, and affective states. The specific content of the unit's task is clearly important, but critical for understanding the processes underlying human capital resource emergence are the interrelationships between the task environment and the unit's behavioral, cognitive, and affective states. Accordingly, we now turn our attention to these important emergence enabling states.

**Emergence enabling states.** There are three broad classes of emergence enabling states: behavioral, cognitive, and affective.<sup>3</sup> Together, these states establish the social environment that facilitates and supports the emergence of human capital resources (cf. Kozlowski & Ilgen, 2006). As a result, the unit's task complexity is necessary, but not sufficient, to determine the nature of the emergent human capital resource. Indeed, if the behavioral, cognitive, and affective enabling states are not present and/or aligned with the task environment, then a valuable human capital resource will not emerge (Barney, 2001).

Borrowing Hackman's (1976) language, emergence enabling states are the "glue" that binds unit members together and allows their interactions through the task environment to amplify and transform KSAOs into a unique, unit-level human capital construct. In this way we think of emergence enabling states as conceptually related to social capital (Adler & Kwon, 2002) inasmuch as we are concerned with the interpersonal relational space that is created in the unit task environment. However, our use of the qualifier "enabling" is intentional to recognize that these states *must* exist in some form if human capital resource emergence is to occur in a manner valuable for the unit. These three emergence enabling states represent the highest order of abstraction, but there are numerous specific

<sup>3</sup> Some (e.g., Marks et al., 2001) refer to unit member behaviors as processes rather than states. We appreciate this distinction but for simplicity refer to these behavioral processes as emergence enabling states.

manifestations of these states that may be relevant to specific situations and tasks. We describe each set of emergence enabling states separately: we first describe the respective state, and we then consider how it interrelates with the unit's task complexity; we conclude by discussing how the states are interconnected.

*Behavioral* processes represent the coordination, communication, and regulatory processes that make individuals' behavior interdependent (Hackman, 1987; Kozlowski & Ilgen, 2006). While task complexity represents the *demands* of the unit task environment, behavioral processes are the actual behavioral actions of members working to fulfill the demands of the task environment. For example, high task complexity may create an intensive workflow structure, but if unit members fail to coordinate or choose not to communicate, then the unit will not effectively meet the demands of the task situation. The manner in which the unit coordinates its members and fosters communication among them in response to task demands leads individual KSAOs to become increasingly similar or complementary (Ilgen et al., 2005; Kozlowski & Ilgen, 2006). Unit adaptation and regulation represent the monitoring, adapting, and regulating of unit member behavior in relation to the unit's task and other unit members' actions (Fleishman & Zaccaro, 1992; Marks et al., 2001).

Task complexity will dictate how unit members will coordinate, communicate, and regulate their behavior (Bell & Kozlowski, 2002; Kozlowski et al., 1999; McGrath, 1984; Steiner, 1972). At low levels of task complexity, unit members need only a minimal amount of coordination to perform effectively, and there is little need to synchronize member behavior. Communication may occur asynchronously, member ties are weak, and the static nature of the task environment requires little need for members to adapt to each other's actions. But human capital resource emergence can occur even at this low level of task complexity since simply by being a member of the unit individuals are exposed to similar experiences, socialization, training, and informal interactions (Kozlowski & Klein, 2000).<sup>4</sup> In this pooled workflow structure the human

capital resource that will emerge will be primarily characterized by similarity among the basic KSAOs needed to perform the task.

At higher levels of task complexity, effective completion of the unit's task requires a greater level of unit members' behavioral synchronization and coordination. As complexity increases, the dynamic nature of the task environment demands detailed, two-way communication among members. Further, members are closely connected and must carefully monitor and adapt to changes in each other's behavior. In this intensive workflow structure human capital resource emergence will occur not only based on similarity among the individual KSAOs needed to perform the task but also based on other complementary types of KSAOs needed for communication, coordination, and adaptation. That is, highly complex tasks may simultaneously contribute to homogeneity among some KSAOs but heterogeneity among others. For example, the highly complex nature of an emergency room setting requires that members coordinate, communicate, and regulate in a manner that creates both homogeneity in KSAOs (e.g., shared knowledge of basic operating procedures) and heterogeneity in KSAOs (e.g., support staff skill in adapting to the surgeon's skill and behavior, surgeon's ability to coordinate and communicate with staff having distributed expertise; Klein, Ziegert, Knight, & Xiao, 2006). At the highest level of task complexity, if unit members fail to coordinate, communicate, or regulate effectively, then a valuable human capital resource cannot emerge from individual KSAOs.

*Proposition 4a: Unit task complexity influences the types of behavioral emergence enabling states manifested in the unit.*

*Proposition 4b: As task complexity increases, human capital resources are more likely to emerge if the unit manifests appropriate behavioral states.*

*Cognitive* states are the second of the emergence enabling states; these refer to the unit's climate, memory, and learning (e.g., Hinsz, Tindale, & Vollrath, 1997). The first—unit climate—reflects the members' shared perceptions of the unit's leadership, goals, expectations, and what is valued and rewarded (Rentsch, 1990). Research has shown that there are different types

<sup>4</sup> Indeed, organizational theorists have documented complex behavioral systems in the presence of low task complexity (e.g., Roethlisberger & Dickson, 1939).

of climates (e.g., climate toward service, climate toward diversity) that not only influence unit-level outcomes but also serve as norms to create homogeneity among members' KSAOs (e.g., Schneider, White, & Paul, 1998). Unit climate establishes the norms through which unit members interact and communicate (Rentsch, 1990) and also helps assimilate new members into the unit more quickly and consistently than if the unit lacked such a climate (a contextual influence on emergence). Unit climate becomes especially critical as task complexity increases. Successful member interactions in intensive workflow structures require that members share expectations for the synchronization, pacing, and quality of their work (Bell & Kozlowski, 2002). For example, developing a climate for safety has been shown to reduce accidents in flight crews and medical intensive care units because members are more willing to admit and improve upon mistakes (Sexton, Thomas, & Helmreich, 2000). Simultaneously, the complexity of the unit task contributes to the strength of climate perceptions because the greater amount of interaction among members allows more opportunity for expectations to be communicated and, hence, shared.

The second cognitive state—unit memory—represents the procedural and declarative knowledge held by unit members that is necessary for them to work together effectively. Organizing, managing, and integrating knowledge are core strategic activities of the firm (Grant, 1996; Youndt & Snell, 2004). One form of collective memory is based on shared memories—for example, unit mental models where members have intimate knowledge of each other and work processes (Klimoski & Mohammed, 1994). As unit members work together, their individual knowledge about each other and the task becomes more similar, and this similarity leads to the emergence of a unit-level phenomenon. Increasing task complexity contributes to and, in turn, requires a greater exchange of knowledge among members. For example, the task demands for a sequential workflow require that members know only the processes that immediately lead to and follow from their own work; the task demands for an intensive workflow require that members know the processes and relationships among all members within the unit.

A different form of collective memory is transactive memory—for example, when team mem-

bers do not have shared knowledge but instead know who has each form of relevant knowledge (e.g., who on the faculty is good with statistics; Wegner, 1995). Here, individual memory about the unit task is not shared, but there is a macro knowledge architecture that helps coordinate individual member expertise and organizational structures to facilitate the integration of such knowledge (Grant, 1996; Youndt & Snell, 2004). The intensive interaction and stronger member ties associated with more complex unit tasks contribute to strengthening unit transactive memory. Indeed, transactive memory is arguably not needed for the emergence of human capital resources in simple task (pooled workflow) structures, but as complexity increases, the dynamic nature of the task environment will require that members know to whom to turn for expertise. Note that to the extent unit transactive memory or unit mental models exist, they also create a form of unit-specific knowledge. That is, unit transactive memory or unit mental models are inherently tied to the specific members of the unit and the task being performed.

The third cognitive state—unit learning—represents the unit's ability to acquire, absorb, and transfer information and knowledge (Argote, McEvily, & Reagans, 2003; Cohen & Levinthal, 1990; Zahra & George, 2002). More complex tasks lead to the facilitation of learning opportunities and, hence, human capital resource emergence because the members engage in more frequent, coordinated, and reciprocal communication and interaction (Youndt & Snell, 2004). The passage of tacit knowledge is most likely when members have frequent interaction in the unit's task environment (Liebeskind, 1996). The greatest opportunity for human capital resource emergence will occur with reciprocal and intensive workflow structures because the reciprocal nature of member interactions requires and facilitates the social capital (Adler & Kwon, 2002) necessary to transfer knowledge and information. This greater intensity of interaction helps knowledge and information transfer more quickly and widely through the unit. Further, as the strength and density of the member ties increase, knowledge gained by one member is quickly disseminated to the unit. For example, in a project team a member may receive training on a new software system. This member may then teach the unit how to use the software so that the unit collec-

tively has knowledge of the software and can improve coordination and efficiency.

*Proposition 5a: Unit task complexity influences the types of cognitive emergence enabling states manifested in the unit.*

*Proposition 5b: As task complexity increases, human capital resources are more likely to emerge if the unit manifests a shared climate and learning and memory structures appropriate for the task (either shared or distributed).*

Affective states represent the third type of human capital emergence enabling state. Affective states are the emotional "bonds" that tie unit members together; they are what individuals "feel" like when they are part of a group. Unit cohesion, trust, and affect (or "mood") are affective processes that render the unit task environment open to, and supportive of, knowledge sharing and dissemination. Cohesion is the extent to which unit members are attracted and committed to each other (Hackman, 1987). Cohesion becomes more critical as the task environment becomes complex because members must synchronize their activities, respond to dynamic and unpredictable changes in the environment, and recycle work back and forth between each other (Beal, Cohen, Burke, & McLendon, 2003). Thus, the greater commitment and attachment to each other increases the strength and number of bonds and ties among members. Cohesive units are also more likely to stick together and adopt proactive problem-solving strategies when dealing with adversity (Kozlowski & Ilgen, 2006).

Likewise, units with greater degrees of trust are more likely to transfer knowledge, ideas, and innovations among members (Nahapiet & Ghoshal, 1998; Oldham, 2003). Trust is not likely to be as critical when the unit task is of lower complexity. For example, only minimal degrees of trust are necessary in sequential workflows because one need only have confidence that the prior members' outputs will be adequate. Alternatively, intensive workflows require high trust because the unit's overall performance is a function of reciprocal, interactive relationships and exchanges among members (e.g., Korsgaard, Schweiger, & Sapienza, 1995). To the extent

members distrust each other, they may withhold relevant information or even provide misleading information.

Unit affect represents the unit's general positive-negative emotional orientation; we can think of this as the general "emotional state" of the unit's task environment. When the unit manifests a generally positive orientation, it enhances the sharing of knowledge and information, supports skill development, and increases willingness to remain with the team (George, 1990; Nahapiet & Ghoshal, 1998). Individuals in more positive moods seek to communicate and interact more with other people (George, 1990), thereby enhancing the spread of information and knowledge. Units are also likely to be more creative and innovative when members are in a positive mood (Oldham, 2003). It is likely that unit affect plays a lesser role in human capital resource emergence when task complexity is low, simply because there is little need for interdependence or communication. However, as task complexity requires greater member interaction, positive mood helps to promote and facilitate intermember exchanges, encouraging members to enhance the sharing and transfer of knowledge (Barsade & Gibson, 1998). Thus, the unit's cohesion, trust, and mood will influence the extent to which individual KSAOs become shared, supported, and mutually developed.

*Proposition 6a: Unit task complexity influences the types of affective emergence enabling states manifested in the unit.*

*Proposition 6b: As task complexity increases, human capital resources are more likely to emerge if the unit manifests greater cohesion, trust, and more positive mood.*

Although we have discussed the emergence enabling states separately, it is clear that they are likely to be interrelated (e.g., Marks et al., 2001). We propose that the interrelationships among unit behavioral, cognitive, and affective states become greater as task complexity increases. When the workflow is pooled, only minimal behavioral coordination and communication are needed to effectively perform the unit's task; hence, there is little need for shared cognitive or affective states to facilitate human capital resource emergence. In contrast, in inten-

sive workflow arrangements the human capital resource will not emerge unless employees work interdependently and communicate, are willing to trust each other, share their knowledge, and learn how to integrate the knowledge collectively (Kozlowski et al., 1999; Mesmer-Magnus & DeChurch, 2009).

Indeed, there is an interdependency among the emergence enabling states such that behavioral states are fundamental to the existence of cognitive and affective states (Kozlowski & Ilgen, 2006; Marks et al., 2001). If unit members do not interact, coordinate, communicate, or adapt to others' behaviors, there will be little opportunity for unit members' cognitive and affective states to manifest and support the emergence of human capital resources. Shared experience and interaction are critical for establishing trust and cohesion (Kozlowski & Ilgen, 2006), and the presence of trust and cohesion is, in turn, critical for members to share knowledge and ideas (Mesmer-Magnus & DeChurch, 2009; Oldham, 2003). If the unit does not develop sufficient cohesion, unit members may begin to question their involvement in the group and withdraw (Hackman, 1992). Likewise, tacit knowledge can only be exchanged through interaction and communication (behavioral processes) as unit members learn each other's roles and, hence, develop transactive memory (Fleishman & Zaccaro, 2002).

Perhaps the easiest way to appreciate the interdependence among emergence enabling states is by considering instances where they do not mesh appropriately. There are highly visible examples of sports teams and music groups with incredible talent who, because of dysfunctional cognitive or affective states, were unable to effectively perform together (e.g., the latter days of the Beatles [Doggett, 2009], the 2004 U.S. Olympic basketball team).

*Proposition 7: As task complexity increases, the interrelationships among behavioral, cognitive, and affective emergence enabling states become stronger.*

*Proposition 8: Behavioral emergence enabling states influence the manifestation of cognitive and affective emergence enabling states.*

### **Manifesting a Collective Phenomenon: The Emergent Human Capital Resource**

We come now to the final part of the model of human capital emergence. As noted before, Kozlowski and Klein observe that the final stage of emergence is "a higher-level collective phenomenon" (2000: 55). Accordingly, in this section we describe that collective phenomenon and the forms that the emergent human capital resource may take as a function of the unit's emergence enabling process. By focusing our attention on the nature of the unit-level resource, we are now squarely within the domain of macrolevel human capital research, which, as we have noted, follows a resource-based logic (Barney, 1991; Peteraf, 1993) in arguing that human capital can be a source of competitive advantage if it is valuable, rare, inimitable, and supported by the organization (Barney & Wright, 1998; Wright et al., 1994). By and large, this literature has focused on context-specific cognitive human capital, such as firm-specific knowledge, skills, and experience (Grant, 1996; Liebeskind, 1996; Nelson & Winter, 1982; Wiersema & Bantel, 1992; Zander & Kogut, 1995; Zhang & Rajagopalan, 2003).

However, while this focus on context-specific cognitive human capital has empirical support, it may have obscured from theoretical consideration the effect on competitive advantage of an entire category of human capital resources that emerge from individual-level, context-generic KSAOs. Here we develop this point and discuss the interrelationship between context-generic and context-specific human capital. Specifically, the multilevel perspective on human capital resource emergence offers the opportunity to suggest ways in which context-generic human capital can, in fact, be a source of unit-level competitive advantage.

**Context-specific human capital resources from context-generic KSAOs.** As discussed above, individual forms of generic and specific KSAOs become amplified through the emergence enabling process and are transformed into collective human capital resources. This suggests an interesting insight at the level of the human capital resource (i.e., the level of the collective phenomenon). Recall that task complexity has the effect of rendering the emergent human capital resource more inimitable given the inherent path dependency, social complexity, and causal ambiguity associated with

greater task complexity (Dierickx & Cool, 1989). Thus, because generic human capital resources (i.e., unit-level resources built from context-generic KSAOs) emerge as a function of the unit's unique emergence enabling process, they effectively become unit specific.

This suggests a dramatic break with the macro literature on human capital. Although context- (i.e., firm-) specific human capital is unquestionably a valuable resource (Grant, 1996; Liebeskind, 1996; Nelson & Winter, 1982; Zander & Kogut, 1995), units that have developed context-generic human capital resources may have also created a resource that is relatively unit specific because it is based on a necessarily unique process of aggregating individual KSAOs into a unit-specific resource (Dierickx & Cool, 1989; Maritan & Peteraf, 2007). In other words, although the individual KSAOs may be generic, the unit-level "complex resource" (Denrell, Fang, & Winter, 2003) that originates in these KSAOs is a unit-specific resource because it is based on the unit's unique emergence enabling process. This argument both supports and elaborates the microfoundations perspective discussed earlier (Abell et al., 2008; Felin & Hesterly, 2007; Teece, 2007). Here, those microfoundations are not only the nature of the individual-level KSAOs at the origin of the unit-level resource but also the social and psychological mechanisms embedded in the emergence enabling process.

To illustrate, consider a firm that has established an above-average stock of context-generic cognitive ability human capital. Although the relative performance contribution of any one *individual's* general cognitive ability in that firm can be replicated by a second firm (e.g., hiring another employee with equally high ability), the first firm's *aggregate* stock of human capital cannot likely be replicated or imitated unless the second firm duplicates the entire emergence process through which the human capital resource is created (Amit & Schoemaker, 1993; Maritan & Peteraf, 2007; Sirmon et al., 2007).

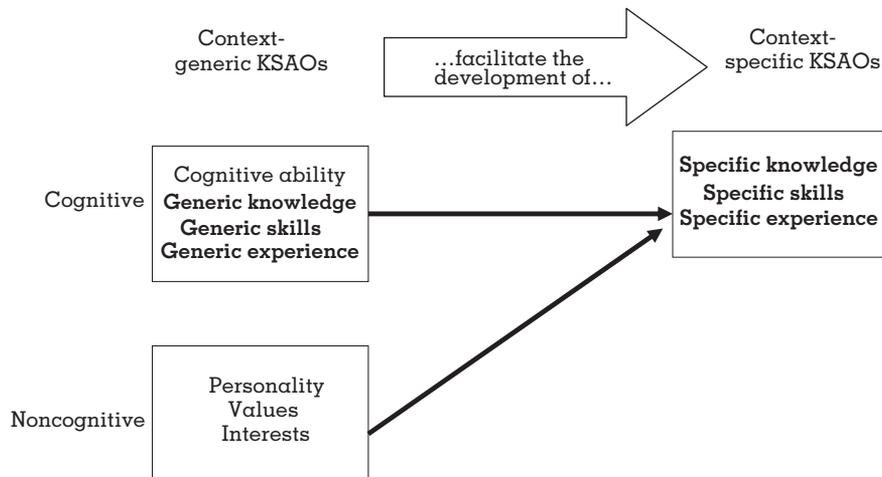
*Proposition 9: Context-generic KSAOs become context-specific human capital resources as a function of a unit-specific emergence enabling process.*

**The causal sequence of human capital resources.** Context-generic human capital resources may also facilitate the creation of con-

text-specific human capital resources. To understand this causal linkage we extend the considerable microlevel research finding that context-generic KSAOs (e.g., general cognitive ability) influence context-specific KSAOs (e.g., knowledge; Motowidlo, Borman, & Schmit, 1997; Schmitt et al., 2003). Context-generic KSAOs provide the "building blocks" on which specialized expertise can be developed (Ackerman & Heggestad, 1997; Carroll, 1993; Jensen, 1998; Kanfer, 1990). For example, those with greater general cognitive ability acquire specific knowledge and skill more quickly than those with less ability, which consequently produces greater task performance (Hunter, 1983). Further, general forms of knowledge and skill (e.g., knowledge acquired through formal education) facilitate the acquisition of specific forms of knowledge and skill (Becker, 1964; Beier & Ackerman, 2003; Hambrick, 2003). Thus, context-generic KSAOs facilitate the development of context-specific KSAOs (Ackerman & Heggestad, 1997; Kanfer, 1990). Figure 2 depicts this causal sequence.

We predict that a similar causal sequence will apply to unit-level human capital resources. It is important to note that we do not suggest that individual-level findings will identically generalize to the unit level; indeed, to do so may be a cross-level fallacy (Rousseau, 1985). Rather, the emergence enabling process we have described will maintain the basic relationship between context-generic and context-specific KSAOs. Recalling that dynamic capabilities in general manifest an iterative reconfiguration of the resource portfolio (Helfat et al., 2007), context-generic forms of human capital resources may facilitate the adaptation of unit-specific human capital resources to new tasks, or may increase the speed of acquiring new unit-specific human capital resources. For example, units that have context-generic human capital are more able to both develop and assimilate knowledge and skills that render the human capital resource more context specific (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Hackman, 1987; Ilgen et al., 2005; LePine, Colquitt, & Erez, 2000). Thus, because complex tasks require greater adaptability and coordination, we expect that context-generic human capital resources (based on general cognitive ability, personality, values, and interest KSAOs) will be a strong determinant of the formation of context-specific human capital resources.

**FIGURE 2**  
**Domains of Individual-Difference KSAOs and Their Causal Interrelationships**



Note: Context-generic KSAOs are generally stable across situations and time, while context-specific KSAOs are generally malleable. KSAOs in bold are those studied in macro human capital research.

Research on absorptive capacity (Cohen & Levinthal, 1990) is illustrative in this regard. In their model of firm-level absorptive capacity, Zahra and George (2002) describe the process whereby firms acquire and assimilate knowledge in a way that leads to sustainable competitive advantage. The process of knowledge acquisition and assimilation, however, assumes a human capital resource that is able to identify, integrate, and transform the external knowledge. Given the individual-level KSAOs at its origin, developing a high-quality stock of a context-generic cognitive human capital resource is therefore necessary to engage effectively in this process. Importantly, however, this process of knowledge assimilation and transformation does not leave the human capital resource unchanged. Indeed, by transforming the acquired knowledge into a unit-specific source of competitive advantage, the human capital is, itself, transformed. New context-specific knowledge structures are created and remain embedded in the unit-level human capital. Thus, context-generic human capital facilitates the process of absorptive capacity (Zahra & George, 2002), which, in turn, results in the creation of context-specific human capital.

Importantly, the causal sequence we posit here suggests that firms that develop a higher-quality stock of context-generic human capital also may be more able to adapt the human capital resource to respond to environmental dynamism and change (Eisenhardt & Martin, 2000; Helfat et al., 2007; Teece, 2007): having a stock of context-generic human capital facilitates the ability of the firm to dynamically adapt the emergent context-specific human capital. This argument leverages the core argument of the DCV perspective (Eisenhardt & Martin, 2000; Helfat et al., 2007; Teece, 2007) outlined earlier. If a particular human capital resource ceases to provide competitive advantage as a function of environmental change (Eisenhardt & Martin, 2000), the ability of the firm to adapt the human capital resource becomes itself a source of competitive advantage (Helfat & Peteraf, 2003). Thus, our arguments regarding the causal sequence of human capital content imply that a stock of context-generic human capital is a vitally important element of the firm's ability to achieve competitive advantage inasmuch as it facilitates the dynamic creation and adaptation of context-specific human capital.

*Proposition 10: Context-generic human capital resources lead to the development of context-specific human capital resources.*

## DISCUSSION

Organizational researchers working in many different scholarly traditions have invoked the human capital construct but, simply put, have

often described different things. Across the body of organizational scholarship, this has resulted in a fractured and, we argue, incomplete theoretical understanding of the human capital resource. Thus, for researchers interested in understanding how *individual human resources* become a *unit-level human capital resource*, the time is right to integrate the considerable bodies of literature related to this question. We have endeavored to do this by tying together the insights from microlevel, intermediate-level, and macrolevel organizational research with the concept of emergence from multilevel theory. In so doing we have both borrowed from and broken with the within-level human capital scholarship that precedes us. This necessarily has a range of implications that we consider now.

### Conceptual Implications

Defining the human capital resource as the unit-level emergence of individual KSAOs may, on the surface, appear similar to existing conceptualizations. For example, Barney and Wright defined human capital as including "such things as the skills, judgment, and intelligence of the firm's employees" (1998: 32), and Skaggs and Youndt defined human capital as "the skills, knowledge, and expertise of employees" (2004: 86). However, our definition makes a sizable break from prior conceptualizations because it emphasizes the cross-level origins of the human capital resource. First, we define the level of theory for human capital resources at the unit level but identify its origins in the psychology of individuals—hence, the human capital resource is, by definition, a multilevel emergent phenomenon. Second, our definition of human capital recognizes that the unit-level resource may originate from multiple types of individual KSAOs. In this regard our conceptualization is more inclusive than prior approaches, allowing for a more complete and nuanced perspective. Third, by defining the level of theory generically at the "unit" level, the human capital resource can exist at the group, department, store, or firm level of analysis, with the relevant aggregation of individual-level KSAOs measured at the level that is theoretically and empirically relevant (see Ployhart, Weekley, & Baughman, 2006). This is desirable because it broadens the conceptualization of human capi-

tal to connect many diverse theories, bodies of literature, and levels.

The conceptual approach we advocate also reconciles an apparent "paradox" between microlevel and macrolevel scholarship: micro scholars emphasize the importance of context-generic KSAOs, whereas macro scholars emphasize the importance of context-specific human capital resources. The multilevel model reconciles this paradox by recognizing that the human capital resource is an emergent phenomenon and is only partially isomorphic with individual KSAOs. Thus, micro scholars should not assume that relationships between individual KSAOs and individual performance ensure sustained competitive advantage, and macro scholars should not assume that only context-specific human capital resources can be a source of sustained competitive advantage. Research testing these possibilities could have far-reaching implications. For example, universalistic microlevel assumptions that "more cognitive ability is better" may not be true at the unit level because the competitive advantage in an organization's environment might, quite simply, not be driven by cognitive human capital (Barney, 2001). Findings for such questions could challenge some of the core "truths" of management scholarship.

### Measurement and Analysis Implications

Defining human capital as a unit-level construct also has broad implications for empirical measurement and testing. Describing the process of emergence is often a methodological endeavor in the microlevel literature and is nearly wholly ignored in the macrolevel literature. Both micro and macro scholars can use the model to theoretically explain the origins and processes of human capital emergence. For example, depending on the unit's task complexity, there may be instances where simple additive aggregations of KSAOs represent a valid measurement of the human capital resource, while in other instances researchers may find that human capital resources interact. The unit-specific emergence enabling process will determine whether additive or multiplicative KSAO aggregations occur. Although it may not always be possible to measure the entirety of the emergence enabling process, in general, human capital scholarship will be enhanced when researchers articulate how and why human capital emergence should

occur (see Liao & Chuang, 2004, for an excellent illustration).

Second, researchers should be careful to operationalize the *form* of the human capital resource in a manner consistent with their theory of the emergence enabling process. Human capital resource emergence may exist on a continuum ranging from homogeneity in KSAOs (composition) to heterogeneity in KSAOs (compilation; Bliese, 2000; Chan, 1998; Kozlowski & Klein, 2000). On the one hand, for example, the emergence enabling process may lead to homogeneity of KSAOs, and, thus, a composition measurement model is appropriate and human capital resources should be operationalized as the average KSAOs within the unit. On the other hand, the emergence enabling process may lead to heterogeneity of KSAOs, and, thus, a compilation measurement model is appropriate and human capital resources should be operationalized as the variability of KSAOs within the unit. Chan (1998), Bliese (2000), and Kozlowski and Klein (2000) provide in-depth guidance for operationalizing different forms of emergence.

Finally, research should avoid using proxy measures (e.g., HR practices, education) or single-respondent self-reports of human capital. Although we realize that practical constraints may frequently necessitate the need for proxy measures and that some disciplines (such as economics) may have different views about whether proxy measures are problematic, we believe that, *whenever possible*, it is preferable to use measures of KSAOs and then aggregate them as appropriate for the emergence model theorized (e.g., Fulmer et al., 2003; Gerhart, 2005; Wright & Haggerty, 2005).

### Exogenous Implications

An important and potentially exciting area for future research will be identifying factors that influence human capital resource emergence. One of the most promising avenues for future research will be linking the literature on HRM systems, policies, and practices (e.g., Becker & Huselid, 2006; Becker, Huselid, & Beatty, 2009; Boudreau & Ramstad, 2005; Delery & Shaw, 2001; Jackson & Schuler, 1995; Lepak et al., 2006; Ostroff & Bowen, 2000) with the model of human capital emergence. If human capital resources emerge from KSAOs embedded within organizational units, then it is the organization's

HRM systems, policies, and practices that should most strongly shape the nature of the individuals admitted to, developed in, and retained within the firm. Thus, future research might examine how different HR systems can lead to different forms of human capital resource emergence (see Lepak et al., 2006, for many possibilities). The multilevel model also prompts new ways of conceptualizing the effects of HR by recognizing that the relationship between HR systems, policies, and practices and unit effectiveness is indirect, cross level, and mediated through human capital emergence. Finally, the multilevel model helps develop actionable steps for managing or creating a "differentiated workforce" (Becker et al., 2009; Lepak & Snell, 1999) by showing *how* human capital can be purposefully created for different employee groups.

More generally, the model we have developed suggests that changing the nature of the unit's task will result in the emergence of a different human capital resource. Recall that the baseline motivation of the multilevel model of human capital emergence is the creation of a resource that can be a source of competitive advantage (Barney & Wright, 1998) and that the process of resource creation is a dynamic capability (Helfat et al., 2007) that is, in and of itself, a source of competitive advantage. If the unit's emergent human capital resource ceases to be a source of competitive advantage, then strategic change to the human capital resource base can be achieved through changes to the process through which it is created (Maritan & Peteraf, 2007). Thus, changing the emergence enabling process will change the emergent human capital resource. This has nontrivial managerial implications. Altering the unit's task complexity and/or workflow will change the way that members interact behaviorally, cognitively, and affectively, and this will necessarily result in the emergence of different kinds of human capital resources.

### CONCLUSION

The multilevel model of human capital emergence defines human capital as a unit-level resource that is created from the emergence of individuals' knowledge, skills, abilities, and other characteristics (KSAOs) and takes two theoretical insights as givens. First, individuals dif-

fer in their endowments of KSAOs; second, human capital is a resource that can relate meaningfully to unit-level performance. Our objective was to connect these two fundamental theoretical insights from micro and macro organizational scholarship and ask, "How do individual differences in KSAOs become a valuable unit-level resource?" Multilevel theory provided the point of entry to this question, and the model we have described is our proposed answer. By drawing on multilevel theory to connect these levels, we have endeavored to address the limitations and assumptions that are by-products of within-level thinking. More important, connecting the micro and macro human capital literature in a multilevel model illustrates a powerful synergy between insights within the two bodies of literature. It is our hope and expectation that those synergies will serve scholars working in both areas to develop their research in exciting new directions.

## REFERENCES

- Abell, P., Felin, T., & Foss, N. 2008. Building micro-foundations for the routines, capabilities, and performance links. *Managerial and Decision Economics*, 29: 489–502.
- Ackerman, P. L. 1996. A theory of adult intellectual development: Process, personality, interests, and knowledge. *Intelligence*, 22: 227–257.
- Ackerman, P. L., & Heggstad, E. D. 1997. Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin*, 121: 219–245.
- Adler, P. S., & Kwon, S.-W. 2002. Social capital: Prospects for a new concept. *Academy of Management Review*, 27: 17–40.
- Amit, R., & Schoemaker, P. J. H. 1993. Strategic assets and organizational rent. *Strategic Management Journal*, 14: 33–46.
- Ancona, D., & Chong, C. 1996. Entrainment: Pace, cycle, and rhythm in organizational behavior. *Research in Organizational Behavior*, 19: 251–284.
- Argote, L., McEvily, B., & Reagans, R. 2003. Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science*, 49: 571–582.
- Barney, J. B. 1986. Strategic factor markets: Expectations, luck, and business strategy. *Management Science*, 32: 1231–1241.
- Barney, J. B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17: 99–120.
- Barney, J. B., 2001. Is the resource-based "view" a useful perspective for strategic management research? Yes. *Academy of Management Journal*, 26: 41–56.
- Barney, J. B., & Wright, P. M. 1998. On becoming a strategic partner: The role of human resources in gaining competitive advantage. *Human Resource Management*, 37: 31–46.
- Barrick, M. R., & Mount, M. K. 1991. The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44: 1–26.
- Barsade, S. G., & Gibson, D. E. 1998. Group emotion: A view from top and bottom. In D. H. Gruenfeld, B. Mannix, & M. Neale (Eds.), *Composition: Research on managing groups and teams*, vol. 1: 81–102. Stamford, CT: JAI Press.
- Beal, D. J., Cohen, R. R., Burke, M. J., & McLendon, C. L. 2003. Cohesion and performance in groups: A meta-analytic clarification of construct relations. *Journal of Applied Psychology*, 88: 989–1004.
- Becker, B. E., & Huselid, M. A. 2006. Strategic human resource management: Where do we go from here? *Journal of Management*, 32: 898–925.
- Becker, B. E., Huselid, M. A., & Beatty, R. W. 2009. *The differentiated workforce: Transforming talent into strategic impact*. Boston: Harvard Business Press.
- Becker, G. S. 1964. *Human capital* (3rd ed.). Chicago: University of Chicago Press.
- Beier, M. E., & Ackerman, P. L. 2003. Determinants of health knowledge: An investigation of age, gender, abilities, personality, and interests. *Journal of Personality and Social Psychology*, 84: 439–447.
- Bell, B. S., & Kozlowski, S. W. J. 2002. A typology of virtual teams: Implications for effective leadership. *Group and Organization Management*, 27: 14–49.
- Bliese, P. D. 2000. Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*: 349–381. San Francisco: Jossey-Bass.
- Boudreau, J. W., & Ramstad, P. M. 2005. Talentship, talent segmentation, and sustainability: A new HR decision science paradigm for a new strategy definition. *Human Resource Management*, 44: 129–136.
- Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E., & Volpe, C. E. 1995. Defining competencies and establishing team training requirements. In R. A. Guzzo & E. Salas (Eds.), *Team effectiveness and decision making in organizations*: 330–380. San Francisco: Jossey-Bass.
- Carroll, J. B. 1993. *Human cognitive abilities*. New York: Cambridge University Press.
- Chan, D. 1998. Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology*, 83: 234–246.
- Coff, R. W. 1997. Human assets and management dilemmas: Coping with hazards on the road to resource-based theory. *Academy of Management Review*, 22: 374–402.
- Coff, R. W. 1999. When competitive advantage doesn't lead to performance: The resource-based view and stakeholder bargaining power. *Organization Science*, 10: 119–133.

- Coff, R. W. 2002. Human capital, shared expertise, and the likelihood of impasse in corporate acquisitions. *Journal of Management*, 28: 107–128.
- Cohen, W. M., & Levinthal, D. A. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35: 128–152.
- Cronbach, L. J. 1949. *Essentials of psychological testing*. New York: Harper.
- Delery, J. E., & Shaw, J. D. 2001. The strategic management of people in organizations: Review, synthesis, and extensions. *Research in Personnel and Human Resources Management*, 20: 165–198.
- Denrell, J., Fang, C., & Winter, S. G. 2003. The economics of strategic opportunity. *Strategic Management Journal*, 24: 977–990.
- Dierickx, I., & Cool, K. 1989. Asset stock accumulation and sustainability of competitive advantage. *Management Science*, 35: 1504–1511.
- Doggett, P. 2009. *You never give me your money: The Beatles after the breakup*. New York: Harper Collins.
- Eisenhardt, K. M., & Martin, J. A. 2000. Dynamic capabilities: What are they? *Strategic Management Journal*, 21: 1105–1121.
- Felin, T., & Hesterly, W. S. 2007. The knowledge-based view, nested heterogeneity, and new value creation: Philosophical considerations on the locus of knowledge. *Academy of Management Review*, 32: 195–218.
- Fleishman, E. A., & Zaccaro, S. J. 1992. Toward a taxonomy of team performance functions. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance*: 31–56. Norwood, NJ: Ablex.
- Fulmer, I. S., Gerhart, B., & Scott, K. 2003. Are the 100 Best better? An empirical investigation of the relationship between being a “Great Place to Work” and firm performance. *Personnel Psychology*, 56: 965–993.
- George, J. M. 1990. Personality, affect, and behavior in groups. *Journal of Applied Psychology*, 75: 107–116.
- Gerhart, B. 2005. Human resources and business performance: Findings, unanswered questions, and an alternative approach. *Management Review*, 16: 174–185.
- Gottfredson, L. S. 1997. Why g matters: The complexity of everyday life. *Intelligence*, 24: 79–132.
- Grant, R. M. 1991. The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, 33(3): 114–135.
- Grant, R. M. 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17: 109–122.
- Hackman, J. R. 1976. Group influences on individuals. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology*: 1455–1525. Chicago: Rand McNally.
- Hackman, J. R. 1987. The design of work teams. In J. Lorsch (Ed.), *Handbook of organizational behavior*: 315–342. Englewood Cliffs, NJ: Prentice-Hall.
- Hackman, J. R. 1992. Group influences on individuals in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology*, vol. 3: 199–267. Palo Alto, CA: Consulting Psychologists Press.
- Hambrick, D. C. 2003. Why are some people more knowledgeable than others? A longitudinal study of knowledge acquisition. *Memory & Cognition*, 31: 902–917.
- Hambrick, D. C., & Mason, P. A. 1984. Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9: 193–206.
- Harris, D. H. 1994. *Organizational linkages: Understanding the productivity paradox*. Washington, DC: National Academy Press.
- Hatch, N. E., & Dyer, J. H. 2004. Human capital and learning as a source of sustainable competitive advantage. *Strategic Management Journal*, 25: 1155–1178.
- Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J., & Winter, S. G. 2007. *Dynamic capabilities: Understanding strategic change in organizations*. Malden, MA: Blackwell.
- Helfat, C. E., & Peteraf, M. A. 2003. The dynamic resource-based view: Capability lifecycles. *Strategic Management Journal*, 24: 997–1010.
- Hinsz, V. B., Tindale, R. S., & Vollrath, D. A. 1997. The emerging conceptualization of groups as information processors. *Psychological Bulletin*, 121: 43–64.
- Hitt, M. A., Beamish, P. W., Jackson, S. E., & Mathieu, J. E. 2008. Building theoretical and empirical bridges across levels: Multilevel research in management. *Academy of Management Journal*, 50: 1385–1399.
- Hitt, M. A., Bierman, L., Shimizu, K., & Kochhar, R. 2001. Direct and moderating effects of human capital on strategy and performance in professional service firms: A resource-based perspective. *Academy of Management Journal*, 44: 13–28.
- Holland, J. R. 1997. *Making vocational choices: A theory of vocational personalities & work preferences* (3rd ed.). Odessa, FL: PAR.
- Hunter, J. E. 1983. A causal analysis of cognitive ability, job knowledge, job performance, and supervisory ratings. In F. Landy, S. Zedeck, & J. Cleveland (Eds.), *Performance measurement and theory*: 257–266. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. 2005. Teams in organizations: From input-process-output models to IMO models. *Annual Review of Psychology*, 56: 517–543.
- Jackson, S. E., & Schuler, R. S. 1995. Understanding human resource management in the context of organizations and their environments. *Annual Review of Psychology*, 46: 237–264.
- Jensen, A. R. 1998. *The g factor*. Westport, CT: Praeger.
- Kacmar, K. M., Andrews, M. C., Rooy, D. L. V., Steilberg, R. C., & Cerone, S. 2006. Sure everyone can be replaced . . . but at what cost? Turnover as a predictor of unit-level performance. *Academy of Management Journal*, 49: 133–144.
- Kanfer, R. 1990. Motivation theory and industrial/organizational psychology. In M. D. Dunnette & L. Hough (Eds.),

- Handbook of industrial and organizational psychology*, vol. 1: 75–170. Palo Alto, CA: Consulting Psychologists Press.
- Klein, K. J., Dansereau, F., & Hall, R. J. 1994. Levels issues in theory development, data collection, and analysis. *Academy of Management Review*, 19: 195–229.
- Klein, K. J., Ziegert, J. C., Knight, A. P., & Xiao, Y. 2006. Dynamic delegation: Shared, hierarchical and deindividualized leadership in extreme action teams. *Administrative Science Quarterly*, 51: 590–621.
- Klimoski, R. J., & Mohammed, S. 1994. Team mental model: Construct or metaphor? *Journal of Management*, 20: 403–437.
- Kor, Y. Y., & Leblebici, H. 2005. How do interdependencies among human-capital deployment, development, and diversification strategies affect firms' financial performance? *Strategic Management Journal*, 26: 967–985.
- Korsgaard, M. A., Schweiger, D. M., & Sapienza, H. J. 1995. Building commitment, attachment, and trust in strategic decision-making teams: The role of procedural justice. *Academy of Management Journal*, 38: 60–84.
- Kozlowski, S. W. J., & Bell, B. S. 2003. Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology*, vol. 12: 333–375. London: Wiley.
- Kozlowski, S. W. J., Gully, S. M., Nason, E. R., & Smith, E. M. 1999. Developing adaptive teams: A theory of compilation and performance across levels and time. In D. R. Ilgen & E. D. Pulakos (Eds.), *The changing nature of work performance: Implications for staffing, personnel actions, and development*: 240–292. San Francisco: Jossey-Bass.
- Kozlowski, S. W. J., & Ilgen, D. R. 2006. Enhancing the effectiveness of work groups and teams. *Psychological Sciences in the Public Interest*, 7: 77–124.
- Kozlowski, S. W. J., & Klein, K. J. 2000. A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*: 3–90. San Francisco: Jossey-Bass.
- Lepak, D. P., Liao, H., Chung, Y., & Harden, E. 2006. A conceptual review of HR management systems in HRM research. *Research in Personnel and Human Resource Management*, 25: 217–272.
- Lepak, D. P., Smith, K. G., & Taylor, M. S. 2007. Value creation and value capture: A multilevel perspective. *Academy of Management Review*, 32: 180–194.
- Lepak, D. P., & Snell, S. A. 1999. The human resource architecture: Toward a theory of human capital allocation and development. *Academy of Management Review*, 24: 34–48.
- LePine, J. A., Colquitt, J. A., & Erez, A. 2000. Adaptability to changing task contexts: Effects of general cognitive ability, conscientiousness, and openness to experience. *Personnel Psychology*, 53: 563–593.
- Liao, H., & Chuang, A. C. 2004. A multilevel investigation of factors influencing employee service performance and customer outcomes. *Academy of Management Journal*, 47: 41–58.
- Liebeskind, J. P. 1996. Knowledge, strategy, and the theory of the firm. *Strategic Management Journal*, 17: 93–107.
- Lippman, S. A., & Rumelt, R. P. 2003. The payments perspective: Micro-foundations of resource analysis. *Strategic Management Journal*, 24: 903–927.
- Lubinski, D. 2000. Scientific and social significance of assessing individual differences: "Sinking shafts at a few critical points." *Annual Review of Psychology*, 51: 405–444.
- Mahoney, J. T. 1995. The management of resources and the resource of management. *Journal of Business Research*, 33: 91–101.
- Mahoney, J. T. 2001. A resource-based theory of sustainable rents. *Journal of Management*, 27: 651–660.
- Mahoney, J. T., & Pandian, R. 1992. The resource-based view within the conversation of strategic management. *Strategic Management Journal*, 13: 363–380.
- Makadok, R. 2001. Toward a synthesis of the resource-based and dynamic-capability views of rent creation. *Strategic Management Journal*, 22: 387–401.
- Maritan, C. A., & Peteraf, M. A. 2007. Dynamic capabilities and organizational processes. In C. Helfat, S. Finkelstein, W. Mitchell, M. A. Peteraf, H. Singh, D. J. Teece, & S. G. Winter (Eds.), *Dynamic capabilities: Understanding strategic change in organizations*: 30–46. Malden, MA: Blackwell.
- Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. 2001. A temporally based framework and taxonomy of team processes. *Academy of Management Review*, 26: 356–376.
- McCrae, R. R., & Costa, P. T., Jr. 1996. Toward a new generation of personality theories: Theoretical contexts for the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives*: 51–87. New York: Guilford Press.
- McGrath, J. E. 1984. *Groups: Interaction and performance*. Englewood Cliffs, NJ: Prentice-Hall.
- Mesmer-Magnus, J. R., & DeChurch, L. A. 2009. Information sharing and team performance: A meta-analysis. *Journal of Applied Psychology*, 94: 535–546.
- Motowidlo, S. J., Borman, W. C., & Schmit, M. J. 1997. A theory of individual differences in task and contextual performance. *Human Performance*, 10: 71–84.
- Nahapiet, J., & Ghoshal, S. 1998. Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23: 242–266.
- Nelson, R. R., & Winter, S. G. 1982. *An evolutionary theory of economic change*. Cambridge, MA: Belknap Press of Harvard University Press.
- Newbert, S. 2007. Empirical research on the resource-based view of the firm: An assessment and suggestions for future research. *Strategic Management Journal*, 28: 121–146.
- Nishii, L. H., Lepak, D. P., & Schneider, B. 2008. Employee attributions of HR practices: Their effect on employee

- attitudes and behaviors, and customer satisfaction. *Personnel Psychology*, 61: 503–545.
- Oldham, G. R. 2003. Stimulating and supporting creativity in organizations. In S. E. Jackson, M. A. Hitt, & A. S. DeNisi (Eds.), *Managing knowledge for sustained competitive advantage*: 243–273. San Francisco: Jossey-Bass.
- Ostroff, C., & Bowen, D. 2000. Moving HR to a higher level: HR practices and organizational effectiveness. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*: 211–266. San Francisco: Jossey-Bass.
- Pennings, J. M., Lee, K., & van Witteloostuijn, A. 1998. Human capital, social capital, and firm dissolution. *Academy of Management Journal*, 41: 425–440.
- Penrose, E. 1959. *The theory of the growth of the firm* (3rd ed.). New York: Oxford University Press.
- Peteraf, M. A. 1993. The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, 14: 179–191.
- Ployhart, R. E. 2004. Organizational staffing: A multilevel review, synthesis, and model. *Research in Personnel and Human Resource Management*, 23: 121–176.
- Ployhart, R. E., Weekley, J. A., & Baughman, K. 2006. The structure and function of human capital emergence: A multilevel examination of the ASA model. *Academy of Management Journal*, 49: 661–677.
- Ployhart, R. E., Weekley, J. A., & Ramsey, J. 2009. The consequences of human resource stocks and flows: A longitudinal examination of unit service orientation and unit effectiveness. *Academy of Management Journal*, 52: 996–1015.
- Quinones, M. A., Ford, J. K., & Teachout, M. S. 1995. The relationship between work experience and job performance: A conceptual meta-analytic review. *Personnel Psychology*, 48: 887–910.
- Rentsch, J. R. 1990. Climate and culture: Interaction and qualitative differences in organizational meanings. *Journal of Applied Psychology*, 75: 668–681.
- Roethlisberger, F. J., & Dickson, W. J. 1939. *Management and the worker*. Cambridge, MA: Harvard University Press.
- Rousseau, D. M. 1985. Issues of level on organizational research. *Research in Organizational Behavior*, 7: 1–37.
- Rumelt, R. P. 1984. Towards a strategic theory of the firm. In R. B. Lamb (Ed.), *Competitive strategic management*: 556–570. Englewood Cliffs, NJ: Prentice-Hall.
- Schmidt, F. L., & Hunter, J. E. 1998. The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin*, 124: 262–274.
- Schmitt, N., Cortina, J. M., Ingerick, M. J., & Wiechmann, D. 2003. Personnel selection and employee performance. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology*, vol. 12: 77–105. London: Wiley.
- Schneider, B. 1987. The people make the place. *Personnel Psychology*, 40: 437–453.
- Schneider, B., Smith, D. B., & Sipe, W. P. 2000. Personnel selection psychology: Multilevel considerations. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*: 91–120. San Francisco, CA: Jossey-Bass.
- Schneider, B., White, S. S., & Paul, M. C. 1998. Linking service climate to customer perceptions of service quality: Test of a causal model. *Journal of Applied Psychology*, 83: 150–163.
- Sexton, J. B., Thomas, E. J., & Helmreich, R. L. 2000. Error, stress, and teamwork in medicine and aviation: Cross sectional surveys. *British Medical Journal*, 320: 745–749.
- Simon, H. A. 1973. The organization of complex systems. In H. H. Pattee (Ed.), *Hierarchy theory*: 1–27. New York: Braziller.
- Sirmon, D. G., Hitt, M. A., & Ireland, R. D. 2007. Managing firm resources in dynamic environments to create value: Looking inside the black box. *Academy of Management Review*, 32: 273–291.
- Skaggs, B. C., & Youndt, M. 2004. Strategic positioning, human capital, and performance in service organizations: A customer interaction approach. *Strategic Management Journal*, 25: 85–99.
- Smith, A. 1963. (First published in 1776.) *An inquiry into the nature and causes of the wealth of nations*. Homewood, IL: Irwin.
- Spearman, C. 1927. *The abilities of man*. London: Macmillan.
- Steiner, I. D. 1972. *Group process and productivity*. New York: Academic Press.
- Takeuchi, R., Lepak, D. P., Heli, W., & Takeuchi, K. 2007. An empirical examination of the mechanisms mediating between high-performance work systems and the performance of Japanese organizations. *Journal of Applied Psychology*, 92: 1069–1083.
- Teece, D. J. 1982. Towards an economic theory of the multi-product firm. *Journal of Economic Behavior & Organization*, 3: 39–63.
- Teece, D. J. 2007. Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28: 1319–1350.
- Teece, D. J., Pisano, G., & Shuen, A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, 18: 509–533.
- Thompson, J. D. 1967. *Organizations in action*. New York: McGraw-Hill.
- Van de Ven, A. H., Delbecq, A. L., & Koenig, R. 1976. Determinants of coordination modes within organizations. *American Sociological Review*, 41: 322–328.
- Wegner, D. M. 1995. A computer network model of human transactive memory. *Social Cognition*, 13: 319–339.
- Wernerfelt, B. 1984. A resource-based view of the firm. *Strategic Management Journal*, 5: 171–180.
- Westhead, P., Wright, M., & Ucbasaran, D. 2001. The internationalization of new and small firms: A resource-based view. *Journal of Business Venturing*, 16: 333–358.

- Wiersema, M. F., & Bantel, K. A. 1992. Top management team demography and corporate strategic change. *Academy of Management Journal*, 35: 91–121.
- Wiklund, J., & Shepherd, D. 2003. Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses *Strategic Management Journal*, 24: 1307–1314.
- Wright, P. M., & Boswell W. R. 2002. Desegregating HRM: A review and synthesis of micro and macro human resource management research. *Journal of Management*, 28: 247–276.
- Wright, P. M., Dunford, B., & Snell, S. A. 2001. Human resources and the resource based view of the firm. *Journal of Management*, 27: 701–721.
- Wright, P. M., & Haggerty, J. J. 2005. Missing variables in theories of strategic human resource management: Time, cause, and individuals. *Management Review*, 16: 164–173.
- Wright, P. M., McMahan, G. C., & McWilliams, A. 1994. Human resources and sustained competitive advantage: A resource-based perspective. *International Journal of Human Resource Management*, 5: 301–326.
- Wright, P. M., & Snell, S. A. 1998. Toward a unifying framework for exploring fit and flexibility in strategic human resource management. *Academy of Management Review*, 23: 756–772.
- Youndt, M. A., & Snell, S. A. 2004. Human resource configurations, intellectual capital, and organizational performance. *Journal of Managerial Issues*, 3: 337–360.
- Zahra, S. A., & George, G. 2002. Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, 27: 185–203.
- Zander, U., & Kogut, B. 1995. Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. *Organization Science*, 6: 76–92.
- Zhang, Y., & Rajagopalan, N. 2003. Explaining new CEO origin: Firm versus industry antecedents. *Academy of Management Journal*, 46: 327–338.

**Robert E. Ployhart** (ployhart@moore.sc.edu) is a professor of management and Moore Research Fellow at the Darla Moore School of Business, University of South Carolina. He received his Ph.D. from Michigan State University. His primary interests include staffing, recruitment, human capital, and advanced statistical methods.

**Thomas P. Moliterno** (moliterno@moore.sc.edu) is an assistant professor of management at the Darla Moore School of Business, University of South Carolina. He received his Ph.D. from the University of California, Irvine. His research explores the creation and management of organization-level resources and capabilities.

Copyright of Academy of Management Review is the property of Academy of Management and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.