

PSYCHOLOGICAL FOUNDATIONS OF DYNAMIC CAPABILITIES: REFLEXION AND REFLECTION IN STRATEGIC MANAGEMENT

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In recent years, there has been a move to identify the behavioral foundations underpinning the evolutionary and economic fitness of the enterprise. Indeed, the dynamic capabilities project now occupies center stage in the field of strategic management. Yet the accounts developed thus far—like much of the field's theory and research more generally—are predicated upon a cold cognition logic that downplays the significance of emotional/affective and nonconscious cognitive processes for strategic adaptation. In this article, we rectify this imbalance by drawing upon contemporary advances in social cognitive neuroscience and neuroeconomics to develop a series of countervailing insights and new prescriptions for the development of dynamic capabilities. Using Teece's (2007) influential framework to organize and illustrate our arguments, we demonstrate how the fundamental capabilities of sensing, seizing, and transforming each require firms to harness the cognitive and emotional capacities of individuals and groups to blend effortful forms of analysis with the skilled utilization of less deliberative, intuitive processes. Copyright © 2011 John Wiley & Sons, Ltd.

'The decision-making paradigm, as it has developed, is the product of a marriage between cognitive psychology and economics. From economics, decision theory inherited, or was socialized into, the language of preferences and beliefs and the religion of utility maximization that provides a unitary perspective for understanding all behavior. From cognitive psychology, decision theory inherited its descriptive focus, concern with process, and many specific theoretical insights. Decision theory is thus the brilliant child of equally brilliant parents. With all its cleverness, however, decision theory

is somewhat crippled emotionally, and thus detached from the emotional and visceral richness of life.' (Loewenstein, 1996: 289)

INTRODUCTION

Since its earliest days, the field of strategic management has been preoccupied with developing rational and analytical models and theories (e.g., Ansoff, 1965; Hofer and Schendel, 1978) to understand the nature and causes of sustainable enterprise performance (Teece, Pisano, and Shuen, 1997). From Porter's (1980) analysis of competitive positioning informed by the structure-conduct-performance paradigm, to game theoretic analyses of competitive interaction (Brandenburger and Nalebuff, 1996), to the more recent evolutionary (e.g., Nelson and Winter, 1982) and resource-based (e.g., Barney, 1991; Wernerfelt, 1984) perspectives

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informed by Penrose's writings linking internal resources to rent generation, there is no question that the dominant perspectives in classic and contemporary strategic management emanate from the field of economics. Over the past two decades, however, a growing body of work has sought to incorporate the insights of human psychology to refine understanding of a wide variety of topics, from the evolution of competitive industry structures (Peteraf and Shanley, 1997; Porac *et al.*, 1995) to the nature and sources of cognitive bias in strategic investment decisions (Bateman and Zeithaml, 1989; Schwenk, 1984).

Reflecting the field's shift away from an analysis of the organization's external environment to a focus on its internal resources and capabilities, strategy scholars have paid increasing attention to the cognitive and behavioral processes underpinning the capabilities that promote organizational learning, adaptation and performance (e.g., Adner and Helfat, 2003; Alvarez and Busenitz, 2001; Amit and Schoemaker, 1993; Gavetti, 2005; Helfat *et al.*, 2007; Kaplan, 2008; Lane, Koka, and Pathak, 2006; Teece *et al.*, 1997; Tripsas and Gavetti, 2000; Winter, 2000; Zollo and Winter, 2002). This body of theory and research has accomplished much. However, this article argues that recent advances in the emerging fields of social cognitive neuroscience (Lieberman, 2007; Ochsner and Lieberman, 2001) and neuroeconomics (Brocas and Carrillo 2008; Loewenstein, Rick, and Cohen, 2008), and indeed the wider organizational sciences (Gavetti, Levinthal, and Ocasio 2007; Hodgkinson and Healey, 2008), call into question its adequacy as a foundation for future theory building and research in the strategy field. We demonstrate that the extant literature on the psychology of strategic management, like its economics-based counterpart, has emphasized the behavioral and cognitive aspects of strategy formulation and implementation at the expense of emotional and affective ones, leading to an inadequate portrayal of strategic management as a series of rational and dispassionate activities. Our analysis provides fresh insights into the origins and development of dynamic capabilities.

Teece's (2007) framework is the most comprehensive to date for analyzing the psychological foundations of capabilities development. Accordingly, we utilize this framework as a basis for organizing our critique of the wider dynamic capabilities literature as a whole.

PSYCHOLOGICAL FOUNDATIONS OF DYNAMIC CAPABILITIES REVISITED

Teece (2007) posited three generic, behaviorally based dynamic capabilities as the foundations of the evolutionary and economic fitness of the enterprise, namely: (1) sensing (and shaping) opportunities and threats; (2) seizing opportunities; and (3) reconfiguring assets and structures to maintain competitiveness. Sensing requires searching and exploring markets and technologies both local to and distal from the organization. Seizing, in contrast, necessitates making high-quality, interdependent investment decisions, such as those involved in selecting product architectures and business models. The final capability, reconfiguring, entails continuously transforming the firm in response to market and technological changes, such that it retains evolutionary fitness.

Consistent with most traditional dynamic capability formulations, the microfoundations of Teece's (2007) framework rest on an outmoded conception of the strategist as a cognitive miser. This conception stemmed from several interrelated bodies of theory and research in the cognitive sciences, not least Simon's seminal notion of bounded rationality and classical behavioral decision research, which ultimately reinforced the idea that human cognition operates in two discrete modes of information processing—one relatively automatic, the other more effortful and controlled (e.g., Schneider and Shiffrin, 1977). This core assumption has long underpinned a number of lines of inquiry in strategic management, beyond the dynamic capabilities project *per se*, each of which has privileged effortful forms of reasoning and dispassionate analysis as the means of overcoming cognitive bias and strategic inertia (e.g., Dutton, 1993; Hodgkinson *et al.*, 1999; Louis and Sutton, 1991; Reger and Palmer, 1996). However, as indicated in Table 1 contemporary social neuroscience is questioning the veracity of these earlier conceptions of dual-process theory and bounded rationality. Recent developments suggest that the biases and inertial forces that undermine sensing, seizing, and transforming capabilities have emotional roots as well as cognitive ones. Building on this fundamental insight, we maintain that although the tools and processes commonly touted for engineering cognitively effortful reasoning and judgment are undoubtedly a *necessary* component of dynamic capabilities, in practice they are rarely

Table 1. Psychological foundations of dynamic capabilities revisited

Capability	Extant psychological foundations	Indicative supporting literature(s)†	Revised psychological foundations	Indicative supporting literature(s)
Sensing and shaping	Opportunity discovery and creation originate from the cognitive and creative ('right brain') capacities of individuals, requiring access to information and the ability to recognize, sense, and shape developments	Entrepreneurship literature; organizational search (e.g., March and Simon, 1958; Nelson and Winter, 1982)	Identifying and creating opportunities through searching, synthesizing, and filtering information stems from the interaction between reflexive (e.g., intuition, implicit association) and reflective (e.g., explicit reasoning) cognitive and emotional capabilities	Social cognitive neuroscience research on the interaction between reflexive and reflective systems (Lieberman, 2007)
	Recognizing, scanning, and shaping depend on individuals' cognitive capabilities and extant knowledge	Knowledge-based view of the firm (e.g., Grant, 1996); organizational learning (e.g., Levinthal and March, 1993)	Recognizing, scanning, and shaping depend on the capability to harness emotion to update mental representations (e.g., dissonance recognition) and skilled utilization of intuitive processes to synthesize information and form expert judgments	Cognition and capabilities literature (Gavetti, 2005); affective processes in learning (Lieberman, 2000)
Seizing	Seizing innovative investment choices requires managers to override 'dysfunctions of decision making'	Classical behavioral decision theory (e.g., Kahneman and Tversky, 1979)	Seizing opportunities requires the fostering of appropriate emotional reactions to new directions	Neuroeconomics: immediate emotions shape choice (Loewenstein <i>et al.</i> , 2008)
	Overcoming biases requires a cognitively sophisticated and disciplined approach to decision making	Classical behavioral decision theory (e.g., Kahneman and Tversky, 1979)	Cognitively effortful processes can exacerbate bias—alleviating bias and inertia requires both cognitive and emotional capabilities	Self-regulation (e.g., Ochsner <i>et al.</i> , 2002) and affective routes to de-escalation of commitment (e.g., Sivanathan <i>et al.</i> , 2008)
Reconfiguring	Top management ability to coordinate and execute strategic renewal and corporate change	Organizational structure and design and strategy and performance literatures (e.g., Bartlett and Ghoshal, 1993; Chandler, 1962)	Reconfiguration requires management of the transition and repeated redefinition of social identities by alleviating implicit bias and self-regulating emotional responses to identity threats caused by major change	Research on the neural basis of self and social identity processes (e.g., Derks <i>et al.</i> , 2008)

† Note: the references cited in this column are taken from Teece (2007) and Teece, Pisano, and Shuen (1997).

a *sufficient* psychological mechanism for ensuring the long-term adaptability of the enterprise. Indeed, as we shall demonstrate, in some circumstances, conventional approaches for augmenting strategic cognition exacerbate the very problems they seek to alleviate.

According to a growing body of work in social cognitive neuroscience, a reflexive system underpins more automatic and basic affective forms of social cognition, such as implicit stereotyping, automatic categorization, and empathizing with others, while a reflective system, a more controlled system that developed latterly in evolutionary terms, underpins higher forms of cognition, such as logical reasoning, planning, and hypothetical thinking (Lieberman, 2007; Lieberman *et al.*, 2002). Within this view, the two systems operate in a dynamic interplay, reflexion variously facilitating and inhibiting the reflective processes underpinning consciously effortful reasoning and decision making (see also Bechara, Damasio, and Damasio, 2000).

While acknowledging the distinction between automatic and controlled processes, neuroeconomics emphasizes the distinction between emotional and analytical processes. Bernheim and Rangel (2004), for example, view the brain as operating in either a 'cold' cognitive mode or a 'hot' emotional mode, while Loewenstein and Small (2007) similarly distinguish between 'emotional' and 'deliberative' systems. One of the key contributions of neuroeconomics has been to shed light on the conditions under which visceral feelings overcome deliberative thinking in judgment and decision making (for an overview, see Loewenstein *et al.*, 2008).¹

In sum, the left-brain/right-brain cognitive science underpinning Teece's (2007) analysis, which characterizes intuition and heuristic processes as primitive sources of bias, is giving way to the mounting evidence that less deliberative forms of cognition are central to skilled functioning. Rather than acting simply as a disturbance to the reflective system, to be suppressed at every opportunity,

¹ Because the fields of social cognitive neuroscience and neuroeconomics are in their infancy, some of their conclusions are tentative. Hence, wherever possible we avoid drawing on isolated findings relating very specific neural regions to specific behaviors. Rather, we stand back to look at the more generic insights concerning the nature and function of multiple cognitive and affective systems that are rapidly gaining widespread support from multiple methods employed in diverse programs of study.

affect and emotion are integral to the very nature of cognition, infusing reasoning, learning, decision making, and action (LeDoux, 2000). However, as depicted in Figure 1, the bulk of theory and research on the psychology of strategic management has hitherto focused on but one portion of the available conceptual space (i.e., the lower right-hand quadrant of the circumplex). This myopia has yielded an impoverished portrayal of dynamic capabilities. Accordingly, the overarching goal of this article is to open up the wider conceptual space pertaining to the cognitive, affective, and behavioral microfoundations of organizational adaptation (cf. Gavetti *et al.*, 2007). To this end, we explicate alternative psychological foundations for the three dynamic capabilities identified by Teece (2007) and consider the implications for theory building, research, and practice.

SENSING (AND SHAPING) OPPORTUNITIES AND THREATS

The predominance of the information processing view of the firm has ensured that current conceptions of sensing capabilities are decidedly affect free (Day and Schoemaker, 2006; Gavetti and Levinthal, 2000; Prahalad, 2004; Teece, 2007; Tripsas and Gavetti, 2000). However, to the extent

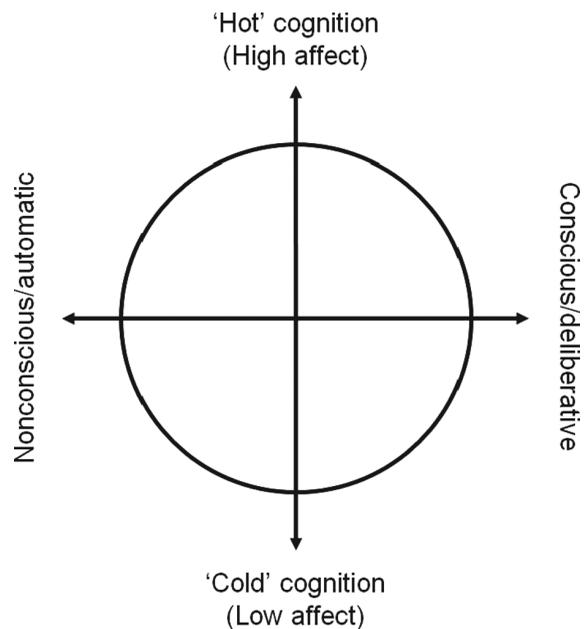


Figure 1. The core dimensions of strategic cognition

that affect controls attention (Compton, 2003), the moods and emotions of managers likely determine to a significant degree what the firm attends to and how it responds, to say nothing of the emotional significance of the stimuli for the individuals concerned. For instance, high anxiety might narrow attention to a subset of events, whereas an overoptimistic mood might lead to a neglect of certain signals. We postulate that affect is also crucial for effective sensing because it provides the motivation for cognitive adaptation.

Affective mechanisms of cognitive change

The ability to update decision makers' mental representations (variously labeled 'schemas,' 'mental models,' and 'cognitive maps') in response to changes in the external environment is a critical sensing capability (Barr, Stimpert, and Huff, 1992; Gavetti, 2005; Gavetti and Levinthal, 2000; Levinthal and March, 1993). Current conceptions of adaptive cognitive change assume that the mere effortful processing of schema inconsistent information disconfirms expectations and jolts decision makers into conscious reflection, thereby forcing them to revise their beliefs (e.g., Dutton, 1993; Hodgkinson *et al.*, 1999; Louis and Sutton, 1991; Reger and Palmer, 1996). However, recent research in neuroeconomics shows that people actively try to shield themselves from information that causes psychological discomfort, the so-called 'ostrich effect' of burying one's head in the sand (Karlsson, Loewenstein, and Seppi, 2009). In keeping with this observation, studies in social cognitive neuroscience show that conflicting information is not the fundamental mechanism of belief revision, but rather how decision makers handle the affective response to that conflicting information (Lieberman, 2000; Lieberman *et al.*, 2001). Hence, the ability to recognize affective signals and utilize affect as information (Finucane *et al.*, 2000; Slovic *et al.*, 2004) is an essential, but hitherto neglected, component of organizational sensing capabilities. By way of illustration, consider the London Stock Exchange's decision to invest in the Taurus software package to support a transactions settlement IT system (Drummond, 2001). Decision makers experienced deep unease in the early stages of the commissioning process, but unable to articulate the logical basis of their ill feelings, they chose to invest on more reasoned grounds. However, having eventually abandoned

the ineffective system, at a cost of £80 million, they then expressed considerable regret at having ignored their initial misgivings. This case demonstrates that when individuals' reasoned reflective responses and visceral reflexive reactions are discordant, effective sensing requires resolution of the disequilibria.

Tensions between reflexive and reflective reactions to opportunities and threats can also occur *between* individuals and groups, as Tripsas and Gavetti's (2000) account of cognitive adaptation at Polaroid illustrates. In this case, senior executives held to a maladaptive belief in an 'instant imaging' business model that discouraged search and development efforts in the growth area of digital imaging, while managers closer to industry changes developed representations that encompassed the emerging digital landscape. Tripsas and Gavetti's (2000) view that the dissonance between the two groups resulted from differences in the industry signals they were receiving construes managers as passive victims of their informational circumstances. The logical extension of this view is that providing the two parties with the same information would have yielded consonant representations. Our analysis suggests an alternative interpretation: because the new information conflicted with executives' assumptions, they likely experienced unease at the mismatch, motivating them to neglect—if not actively reject—the painful information. In contrast, junior managers likely experienced consonance between reflexion and reflection. Put differently, the developments excited one group but troubled the other, leading, respectively, to approach and avoidance. Dissonance between individuals and groups should signal the need to reevaluate and reconcile competing interpretations of strategic events (cf. Burgelman and Grove, 1996). At Polaroid, such reconciliation was noticeably absent, perhaps due to executives' unwillingness to lose self-esteem by relinquishing their embedded assumptions.

Our reanalysis of the Polaroid case highlights the importance of meta-cognitive capabilities—that is, the ability to develop self-awareness of, and to regulate, cognitive and emotional processes (e.g., Nelson, 1996; Ochsner *et al.*, 2002). Managers need to test the validity of their reflexive reactions to a given strategic issue; if those reactions are warranted, the firm should take whatever course of action is deemed appropriate. In cases where further analysis reveals those reflexive responses are

due to managers' underlying beliefs being out of line with the overall attractiveness of the opportunity or threat in question, this likely signals the need to update the executive knowledge base. While recalibrating decision makers is often difficult, because individuals are typically unable to step outside their own framings of the problem at hand (Fischhoff, 1982), group approaches provide a potentially useful means of crosschecking affectively rooted assumptions.

Effective sensing also requires the development of a psychologically secure learning climate—one that takes account of affective signals and intuitive cognitions but also enables, where appropriate, effortful, deliberative processing. Routines that overly focus on planning for the negative consequences of events are likely to heighten negative affect and threat rigidity and ultimately induce avoidance behavior (Staw, Sandelands, and Dutton, 1981). The converse approach of building routines that mitigate negative affect and create the psychological space for building positive affect around opportunities and threats is conducive to adaptation, because positive affect boosts responsiveness to events by broadening the scope of attention, cognition, and action repertoires (Ashby, Isen, and Turken, 1999; Fredrickson and Branigan, 2005). The preceding arguments suggest the following proposition:

Proposition 1: Organizations that rely on 'hot cognition' enhancing technologies (i.e., tools and processes aimed at mental model change underpinned by emotionally supportive mechanisms) as an aid to sensing will be significantly less likely to fall prey to cognitive blind spots and strategic inertia than organizations that rely on 'cold cognition' enhancing technologies (i.e., tools and processes aimed at mental model change in the absence of emotionally supportive mechanisms).

To illustrate the practical implications of this proposition, consider the role of scenario planning as an aid to sensing, commonly employed to stretch actors' beliefs regarding future uncertainties (e.g., Schoemaker, 1993). Hodgkinson and Wright's (2002) case analysis illustrates the dangers of designing interventions based solely on a cold cognition logic. The goal in this case was to inculcate mental model change. However, forcing the management team to envisage threatening

future scenarios in a vivid manner raised decisional stress and conflict to unacceptably high levels, leading it to adopt dysfunctional coping strategies. In contrast, Doz and Kosonen (2008) observe how organizations such as IBM and Nokia meet the need for psychological security by building a 'culture of care' when seeking to reform the beliefs of actors facing threatening changes. Practical steps include adopting routines that encourage managers to share their emotions and empathize with one another and the use of techniques that construe strategic change in such a way that those affected do not disconnect the new requirements from enduring sources of pride.

Incorporating intuition into the sensing process

As we have indicated, strategy research has conventionally equated what Tece (2007) outlined as sensing (and shaping) capabilities with explicit, deliberative learning and elaborative formal reasoning and analysis (e.g., Porter, 1980; Zollo and Winter, 2002; for an exception, see Levinthal and Rerup, 2006). However, this view understates the advantages of nonconscious forms of cognition for navigating the social environment (Bargh and Chartrand 1999; Bargh and Ferguson 2000). A particular advantage of reflexive processes is their ability to cut through masses of information about trends in the business environment to reach effective judgments on opportunities and threats. As Sir Martin Sorrell, CEO of WPP recently observed, 'the reality is that leaders must, on the spur of the moment, be able to react rapidly and grasp opportunities' (Sorrell, Komisar, and Mulcahy, 2010: 46).

Dane and Pratt's (2007: 40) succinct definition, 'affectively-charged judgments that arise through rapid, nonconscious, and holistic associations,' renders abundantly clear why intuition is apposite to the sensing process. While the reflective (i.e., deliberative) system, restricted to the serial processing of small numbers of items, becomes overloaded when faced with complex strategic situations, intuition brings to bear large quantities of implicit knowledge in a focused manner (cf. Dutton, 1993). Moreover, in many strategic situations, executives must operate under time constraints, from the early detection and evaluation of emerging opportunities and threats, to the defense of hostile takeovers, to interventions by regulators. There is a wealth of evidence to suggest

that the nonconscious pattern-matching and visceral processes at the heart of intuitive judgment (Lieberman, 2000) likely play a critical role in these circumstances (for overviews see Dane and Pratt, 2007; Hodgkinson, Langan-Fox, and Sadler-Smith, 2008; Hodgkinson *et al.*, 2009; Hogarth, 2001; Klein, 2003).²

Incorporating intuition into the sensing process demands a reconsideration of the role of information technologies of the sort widely advocated as an aid to organizational responsiveness (cf. Teece, 2007). Knowledge management systems, databases, and expert systems designed to externalize knowledge ultimately transfer the tasks of search and sensemaking from the decision maker to the technology. This move precludes the rapid pattern-matching processes that characterize expert decision making, thus undermining true sensing. Mintzberg (1994: 299) illustrated the problems with such architectures in his analysis of elaborate strategic planning systems that 'offered no improved means to deal with the information overload of human brains; indeed, they often made matters worse... The formal systems could certainly process more information... But they could never internalize it, comprehend it, synthesize it.' Giving due credence to reflexion in sensing requires that supporting analytical technologies be deployed in ways that exploit managers' implicit knowledge and intuitive expertise. The goal is to design search architectures to take advantage of reflexion rather than replace it with technology or effortful reasoning (Jolls, Sunstein, and Thaler, 1998). Hence:

² Another form of cognition integral to the strategic sensing process is analogical thinking, which involves the comparison of a novel strategic problem (i.e., the target) to one previously encountered (i.e., the source problem). Gavetti, Levinthal, and Rivkin (2005: 695) depict the use of analogy in strategic management as an explicit reasoned process whereby having identified the problem at hand, managers use 'some computational procedure to scour other settings with which she is familiar.' This view, which privileges effortful cognition at the expense of non-conscious cognitive/affective processes, typifies the wider field's overriding preoccupation with rationality. In marked contrast, cognitive psychologists such as Holyoak and Thagard (1995) define analogy as an implicit cognitive process applied to explicit knowledge. Hence, a more accurate portrayal of the way strategists form analogies would recognize the reliance on relatively automatic, creative processes to form 'mental leaps' between novel and familiar strategic problems via implicit reference to the abstract concepts that link them. This depiction is consistent with our overarching argument that strategic learning requires the blending of reflective and reflexive capabilities.

Proposition 2: Organizations that incorporate intuition into their repertoire of sensing capabilities will identify and respond to opportunities and threats more effectively than organizations that rely solely on analytic approaches.

One means of incorporating intuition into the repertoire of sensing capabilities is to configure decision making units so as to possess the requisite mixture of individuals with analytical and intuitive cognitive styles (Hodgkinson and Clarke, 2007). Other prescriptions range from recognizing and rewarding those who effectively rely on expert intuition rather than fall back on established procedures (Klein, 2003), to building in 'mental time-outs' to allow creative ideas to incubate (Sadler-Smith, 2010). However, recognizing when to rely on intuition is a vital skill in itself. Kahneman and Klein (2009, 2010) suggest that intuition is appropriate for informing executive action when: (1) there is sufficient environmental regularity to learn the cues that enable the recognition of patterns and irregularities and (2) decision makers have learned those cues. The latter criterion emphasizes the domain-specific nature of intuitive expertise. For example, although a manager with 10 years experience in a particular sector might well provide valid intuitive judgments on developments within that sector, it is unlikely that the validity of those judgments would generalize to other sectors.

SEIZING OPPORTUNITIES

It is clear from Teece's (2007) analysis that two major psychological barriers potentially undermine seizing capabilities. First, organizations must be able to evaluate sensed opportunities and threats in a progressive, forward-looking manner and, where appropriate, commit to them in a timely fashion. Second, in order to do so, they must be able to unlock dysfunctional fixations with existing strategies to mitigate or remove decisional bias, inertia, and strategic persistence. As indicated in Table 1, we maintain that developing routines commensurate with the affective mechanisms underpinning decision making provides the ultimate bases for meeting both of these challenges.

Evaluating and selecting new opportunities

A well-documented tendency is for organizations to shun innovative investment choices in favor of incremental improvements in keeping with their prevailing competencies (Henderson and Clark, 1990; Nelson and Winter, 1982). Drawing on the insights of prospect theory (Kahneman and Lovallo, 1993; Kahneman and Tversky, 1979), Teece (2007) attributes this dysfunction to biases in the computational mechanisms of subjective probability assessment, centered on loss aversion and the certainty effect. From this consequentialist perspective, organizations shun innovative investment choices because their decision makers undervalue new alternatives, based on biased calculations of their likelihood of success. However, more recent evidence that valuation by feeling explains many significant economic behaviors has eroded the long-held assumption that valuation proceeds by calculation and computation alone (Kahneman, Ritov, and Schkade, 1999).

Contemporary developments in the decision sciences highlight the critical influence of felt emotions on choice. Loewenstein *et al.*'s (2001) risk-as-feelings model, for example, emphasizes that people typically act based on the emotions they experience at the time of choice in reaction to their mental images of choice outcomes rather than calculations of the probability or expected utility of those outcomes. A welter of evidence demonstrates that when assessments based on affect are at odds with those based on computation, the visceral often overpowers the rational to determine behavior (Loewenstein, 1996; Loewenstein *et al.*, 2001, 2008; Rottenstreich and Hsee, 2001). The work of Damasio and colleagues (Bechara *et al.*, 2000; Damasio, 1994) shows that the affective consequences of potential courses of action are encoded in somatic markers, which the prefrontal cortex translates for the brain's emotion centers to guide behavior. Mere activation of a marker provides an immediate basis for action without deliberation, although the marker's visceral information often informs subsequent deliberation. Crucially, whether instigated by cognitive appraisal or the more direct routes emphasized by Damasio (1994) and others, it is the resultant feeling states that determine overt behavior (see also Finucane *et al.*, 2000; Sanfey *et al.*, 2003; Slovic *et al.*, 2004; Zajonc, 1980). This general point was well appreciated in Janis and

Mann's (1977) classic treatise on decision making, but has been overlooked in contemporary strategy research.

The crucial implication of these developments is that harnessing, rather than suppressing, visceral reactions to strategic alternatives is critical to seizing capabilities. In cases where negative affective reactions to new opportunities outweigh the positive feelings invoked, it is unlikely that decision makers will commit fully to pursuing the developments in question—even where more dispassionate, consequentialist analyses are favorable. Because affect arises from salient imagery linked to the experience of choice outcomes, the vividness and valence of such imagery play a vital role in determining affective valuation and subsequent approach-avoidance behavior. By way of illustration, consider again the Tripsas and Giavetti (2000) case, in which Polaroid was contemplating a move away from its existing business model to one that prioritized alternative offerings. On one hand, the new model may have brought forth imagery associated with technological developments and rapid market growth, in turn stimulating excitement and hope; such positive emotional reactions are favorable to seizing. On the other hand, the negative mental imagery associated with potential job losses arising from the implementation of the new model might well have stimulated fear and unease. The fact that people tend to overreact emotionally to new risks (Loewenstein *et al.*, 2008) and weigh negative affect more heavily than positive affect in decision making (Ito *et al.*, 1998) compounds such affective barriers to seizing. The foregoing analysis suggests the following proposition:

Proposition 3: The greater the extent to which firms foster emotional commitment to new investment opportunities, the greater the likelihood they will seize those opportunities.

To illustrate the practical implications of this proposition consider again the role of scenario planning. In the light of the foregoing analysis, the next generation of scenario planning techniques could be adapted explicitly for building emotional as well as cognitive commitment to emerging prospects. In the context of seizing, the affect-inducing properties of scenario analysis, when skillfully deployed, could serve as a vehicle to generate and foster strong and vivid positive mental imagery pertaining to new opportunities, in turn

stimulating the required visceral reactions to seize the most promising ones (Healey and Hodgkinson, 2008).

Notwithstanding the potency of building emotional commitment as a mechanism for fostering seizing, there are situations when too much emotional commitment can be problematic. Marks and Spencer's (M&S) acquisition of the Brooks Brothers retail chain for \$740 million during the late-1980s exemplifies this problem (Finkelstein, Whitehead, and Campbell 2008). Despite a welter of analytical evidence that this move was inadvisable, M&S Chairman Derek Rayner drove through the purchase, fueled by the overwhelming positive feelings he experienced in reaction to the long-standing imagery he associated with Brooks Brothers' exclusive clothing products. This decision was to cost more than \$1 billion, upon subsequently divesting the poorly performing acquisition for just \$225 million. More generally, this case illustrates that when visceral reactions to a low probability/utility but affect-laden alternative outweigh reasoned reactions to a high probability/utility but affect-free alternative, the primacy of the emotional reaction dictates a potentially suboptimal course of action. In all probability, seizing the opportunity in question in such circumstances is ill advised. Finkelstein *et al.* (2008) outline various safeguards available to help organizations overcome inappropriate emotional attachments to strategic issues and courses of action. These include monitoring processes designed to identify so-called 'red-flag' situations, in which decisions are proceeding based on such attachments, and the separation of decision and governance mechanisms to counter individuals' emotional fixations.

Unlocking fixations with existing strategies

It is important to recognize that although acts of omission (i.e., the failure to pursue fruitful new avenues) can prove more costly than errors of excessive commission (i.e., the tendency to embark on new, ultimately flawed, courses of action), such omission often stems from overcommitment to existing projects (Bazerman and Watkins, 2004). In order to pursue new opportunities, therefore, firms must often shed—or at least lessen—their commitment to existing directions (Eisenhardt and Martin, 2000; Teece, 2007; Teece *et al.*, 1997). One of the most significant biases that militates

against this requirement is escalation of commitment, the tendency to 'throw good money after bad' in support of failing investments in an attempt to justify prior choices (Staw, 1976; Staw and Ross, 1987).

Hitherto, and again based on early behavioral decision research that saw biases such as framing and overconfidence as resulting from intuitive processes (e.g., Gilovich, Griffin, and Kahneman, 2002), strategy scholars have generally assumed that the means for overcoming escalation of commitment and related dysfunctions is to engage decision makers in more effortful and analytical information processing (Hodgkinson *et al.*, 1999, 2002; Schwenk, 1986; Wright and Goodwin, 2002). Drawing upon this conventional line of reasoning, Teece (2007: 1333) suggests that, 'overcoming biases almost always requires a cognitively sophisticated and disciplined approach to decision making.' However, merely encouraging rational and effortful information processing *per se* can exacerbate escalation of commitment and related problems. Indeed, individuals with rational thinking styles (who favor effortful, analytical reflection) are particularly prone to escalation because they feel the pressure for vindication more intensely (Wong, Kwong, and Ng, 2008). Fortunately, recent work has begun to provide mechanisms for addressing the core emotional roots of escalation and related decision biases. For example, stimulating negative affect when considering whether to reinvest in a failing course of action reduces escalation because decision makers withdraw their commitment to avoid future regret and the anxiety associated with costs sunk in error (Ku, 2008; Wong, Yik, and Kwong, 2006). Hence:

Proposition 4: The greater the strategic decision making unit's tendency to incorporate salient negative affectivity associated with extant courses of action, the lower the likelihood it will fall prey to escalation of commitment and related dysfunctional decision traps.

This analysis highlights the capacity for self-regulation as an important means of overcoming dysfunctional fixations. Self-regulation involves controlling internal ego-protective goals (Lord *et al.*, 2010), which are the root cause of the desire to justify specific choices to the self and others in escalation situations. One means of implementing this requirement for self-regulation is to

reflect on how new courses of action facilitate the attainment of self-esteem enhancing goals, which essentially transfers the basic drive for self-esteem protection from maintenance of the status quo to the active pursuit of new directions (Henderson, Gollwitzer, and Oettinger, 2007; Zhang and Baumeister, 2006). Sivanathan *et al.* (2008) demonstrated the effectiveness of this approach in a study of de-escalation in financial decision making. Giving decision makers the opportunity to affirm their overall self-esteem and personal integrity after they had committed resources to an ineffective strategy made them less inclined to invest further because confidence in the self had alleviated the desire for self-justification that motivates escalation.

RECONFIGURING ASSETS TO MAINTAIN COMPETITIVENESS

Teece's (2007) explication of the psychological foundations of transforming/reconfiguring is relatively underdeveloped in comparison with his analysis of sensing and seizing, in part because strategy research on the human aspects of the latter capability has been in short supply. However, as noted by Augier and Teece (2009), one of the foremost behavioral challenges associated with the reconfiguration of the enterprise concerns managing the effects of transformation on the core identities and motivations of key individuals and groups. We extend and deepen Teece's framework by explicating how the capacity to reconfigure social identities using reflexive and reflective processes in concert is critical to successful organizational transformation.

When change threatens the salient identities and associated self-concepts of managers and employees, considerable resistance can breed at all levels of the organization (Gioia, Schultz, and Corley, 2000; Haslam, Eggins, and Reynolds, 2003; Hogg and Terry, 2000); actors cling to and defend old directions and ways of thinking intertwined with prevailing identities and actively resist new strategic initiatives that challenge those identities (Elsbach and Kramer, 1996; Hogg and Terry, 2000; Nag, Corley, and Gioia, 2007). In this sense, the fundamental identity of the firm becomes a trap that constrains its adaptive capacity (Bouchikhi and Kimberly, 2003, 2008).

As with earlier work on overcoming dysfunctions in sensing and seizing, the bulk of theory and research concerning the problem of identity inertia during strategic change has focused on cold cognition routes to identity change. Building a common group identity that embraces the extant identities under threat (Hogg and Terry, 2000) and establishing a fluid organizational identity that facilitates adaptation (Gioia, Schultz, and Corley, 2000) are the favored solutions. However, this cold cognition logic overstates the ease of cognitive identity reconstruction and underestimates the emotional difficulties associated with identity threat and the affective processes that mediate the transition to new identities. Given that the social pain caused by identity threat activates the same neural networks as physical pain (Lieberman and Eisenberger, 2009), addressing emotional mechanisms underpinning successful identity change is critical to reconfiguring. As indicated in Table 1, the emerging evidence in social cognitive neuroscience emphasizes the importance of actors' capabilities to regulate automatic and emotional reactions to self and social identity threats, especially heightened anxiety (Scheepers and Ellemers, 2005), which affect the ability to see new directions without prejudice and embrace changes that impinge upon extant salient identities.

Since much of the bias against the people (e.g., the champions of particular strategic change initiatives) and events (e.g., restructuring to meet the challenges of new opportunities and threats) at the heart of reconfiguring stems from automatic social categorization and stereotyping processes controlled by the reflexive system (Amodio, 2008; Dovidio, Pearson, and Orr, 2008), merely encouraging the conscious monitoring and adjustment of prejudices through reflective processes is an insufficient basis for overcoming them. Similar to the alleviation of escalation of commitment, the self-regulation of emotional response is a crucial mechanism for overcoming identity-based resistance to change (Amodio, 2008; Derks, Inzlicht, and Kang, 2008; Klein, Rozendal, and Cosmides, 2002). However, whereas self-regulation in seizing concerns top managers' ability to regulate their own feelings, self-regulation in transforming concerns the ability of managers at all levels to identify, interpret, and respond to the emotions of stakeholders throughout the organization (cf.

Huy, 1999, 2002). Because threats to social identities threaten, by extension, the identities and self-concepts of individuals who identify strongly with the entity in question, affirming those aspects of the salient identities unaffected by the required strategic change can help reduce the desire to cling to and defend the extant identity of the organization as a whole. In consequence, actors will be more inclined to embrace the new direction and accompanying work practices. It thus follows that:

Proposition 5: The greater the capacity of the organization to regulate identity-based affective responses to change, the greater the likelihood of successful strategic transformation.

As with sensing and seizing, one of the most significant practical requirements for supporting identity transition during strategic transformation is the creation of a psychologically secure emotional climate. Practices suitable for this purpose include training and coaching in the art of emotional balancing—i.e., attending to feelings expressed during identity-threatening change episodes, while building emotional commitment to identity attributes consonant with the new strategic direction (cf. Huy, 1999, 2002).³

GE's recent 'ecomagination' project and the ongoing transformation of the Intel Corporation (Heath, 2010) illustrate these principles in action. In highlighting its own industry-leading green products to its employees, GE is demonstrating that it already has the people and skills needed to succeed in a world focused on sustainability. By appealing on impassioned grounds to a new direction that fits with aspects of the firm's core, the organization is easing the transition to a new identity as an innovator of sustainable solutions in a way that reassures rather than threatens. In similar vein, as PC growth slows, the Intel Corporation is transforming itself into a provider of digital platforms for health, entertainment, and mobile applications by using inspiration and motivation rather than intellectual justification. One potential barrier

³ Perhaps readers will be tempted to conclude that the most straightforward way to alleviate the emotional problems associated with sensing, seizing, and transforming is to routinize high levels of turnover within the organization, a practice advocated by some change management theorists and endorsed by Teece (2007). However, the short-term benefits of such practices need to be weighed carefully against the concomitant losses of deep-seated situational judgment, knowledge, and expertise, which take many years to accumulate but only seconds to destroy.

to this project is that the senior engineers who built their careers around Intel's identity as a 'chip builder' feel directionless. Sensitized to this danger, Intel's recent national advertising campaign features star engineer Anjay Bhatt, coinventor of the USB, walking into a canteen cheered on by adoring employees. The message is that Intel's heart already fits with the new focus on product innovation. As with GE's attempts, this approach seeks to facilitate identity transition using emotionally supportive mechanisms.

IMPLICATIONS

We prefaced this article with Loewenstein's (1996) provocative critique of decision theory because it resonates strongly when stepping back to gaze critically upon the behavioral microfoundations of contemporary strategic management theory. Teece's (2007) framework is not alone in privileging calculation and computation through cold, effortful processes as the primary route to organizational adaptation and performance. Like earlier work that investigated strategic issue diagnosis (Dutton and Jackson, 1987; Jackson and Dutton, 1988) and competitive positioning strategy (Hodgkinson, 1997; Peteraf and Shanley, 1997; Porac *et al.*, 1995; Reger and Palmer, 1996) from a cognitive standpoint, the dynamic capabilities project as a whole divorces cognition from emotion and affect and affords only a minimal role to automatic and nonconscious processes (see, e.g., Adner and Helfat, 2003; Alvarez and Busenitz, 2001; Amit and Schoemaker, 1993; Gavetti, 2005; Kaplan, 2008; Lane *et al.*, 2006; Tripsas and Gavetti, 2000).

Our article has demonstrated how the development and maintenance of dynamic capabilities requires firms to harness managers' reflexive and reflective abilities, to utilize implicit and explicit cognitive and emotional processes in harmony, to facilitate sensing, seizing, and reconfiguration. In so doing, it responds to Gavetti *et al.*'s (2007) call to render theories of capabilities development and organizational adaptation consistent with what we know about human functioning from contemporary advances in the psychological sciences. The result of this endeavor is a behaviorally more plausible depiction of organizations: driven by thinking and feeling inhabitants who are fired by affect,

and often as reliant on inspiration and the skillful management of emotion and intuition as on calculating cognition.

Implications for future research

Our analysis opens up fertile terrain for a new wave of behavioral strategy research. Accordingly, we call for a systematic program of work that conceives metacognition, emotion management, and self-regulation as core dynamic managerial capabilities. Such a project would build on Bandura's (1991) observation that purposive organizational activity requires more than applying cognitive operations to existing knowledge to generate solutions—a tenet of knowledge-based theories of the firm (Grant, 1996)—because affective and emotional self-regulatory processes ultimately determine how well human information processing systems function (see also Bandura, 1986).

As a first step, we envisage a program of empirical studies designed to test our basic propositions. Our first two propositions predict that organizations that explicitly incorporate affective signals and intuitive processes into their sensing routines will be less likely to fall prey to the vagaries of cognitive blind spots and cognitive inertia. These propositions could be tested directly by comparing the outcomes enjoyed by firms whose prevailing 'cognitive climates' (Kirton and McCarthy, 1988) support the use of hot cognition enhancing technologies and processes with the outcomes of firms that fall back on conventional analytical tools and approaches to sensing. Instruments designed to assess individuals' chronic preferences for analytical and/or intuitive approaches to decision making (e.g., Epstein *et al.*, 1996) could be readily adapted to assess the prevailing cognitive climate within organizational subunits and strategic decision making teams. In-depth qualitative analyses, of the sort undertaken by Brown and Eisenhardt (1997) and Huy (2002), could complement such large-scale studies, by identifying the routines used variously to suppress or harness affective signals in sensing. In a related vein, analyzing the role that affect and emotion play in strategic issue diagnosis could broaden this line of inquiry by assessing, for example, emotional response as a basis for issue categorization, to refine understanding of the approach and avoidance mechanisms at play (cf. Dutton and Jackson, 1987; Jackson and Dutton, 1988).

Our third and fourth propositions highlight the need to examine the nature and effects of felt emotion in strategic decision making, both in reducing commitment to outmoded courses of action and in seizing emerging opportunities. Strategy researchers stand well placed to utilize the laboratory methods of behavioral economics to study the efficacy of affect-inducing techniques for variously building or reducing, as appropriate, emotional commitment to investment prospects. One promising direction here is to use organizationally relevant vignettes and controlled decision tasks to analyze the extent to which decision makers commit resources to prospects framed in cold cognitive terms versus ones framed in affective terms, through the vivid imagining of choice outcomes. In this article, we have deliberately positioned emotion as a positive resource for organizational adaptation. Going forward, however, we need a better understanding of both the positive and negative effects of emotion on strategic choice (Shiv, Loewenstein, and Bechara, 2005). Using survey-based field studies, researchers could examine the impact of emotion on the speed and quality of strategic decision processes and concomitant organizational outcomes (cf. Baum and Wally, 2003). Case study analyses could further elucidate how firms manage emotion when seeking to accelerate strategic decision making in dynamic situations (cf. Doz and Kosonen, 2008; Eisenhardt, 1989). In order to test our fourth proposition, researchers might examine the extent to which high levels of self-esteem resources in the strategic decision making unit enable firms to avoid the perils of escalation of commitment and related dysfunctions rooted in affective mechanisms. Survey measures of core self-evaluation applied to the strategy domain (Hiller and Hambrick, 2005) appear particularly useful for this purpose.

Our final proposition requires comparative case analyses to observe how executives more or less skilled in the art of emotion management seek to monitor and influence the affective processes underpinning identity transition in strategic transformation at different levels of the organization (cf. Sanchez-Burk and Huy, 2008). A pressing need here is to examine whether emotion management routines—i.e., emotional capabilities (Huy, 1999)—prove more efficacious for overcoming identity barriers to adaptation than cold cognitive mechanisms in isolation.

Implications for practice

Our analysis points to a need for tools and practices that will enhance sensing, seizing, and transforming by augmenting the cognitive *and* affective capabilities of individuals and teams. Several commentators have recently offered behavioral prescriptions for strategic intervention which, at first glance, appear to be consistent with our analysis—for example, sharing diverse perspectives, gathering disconfirmatory evidence, discussing uncertainties, and confronting cognitive biases (for representative examples see Day and Schoemaker, 2006; Kahneman and Klein, 2009, 2010; Lovallo and Sibony, 2010). However, upon closer inspection, many of these prescriptions are predicated on a cold information processing logic. One reason executives are often reluctant to embrace practices that involve questioning their personal judgments is precisely because these practices raise, rather than assuage, emotional barriers. It is tempting, therefore, to call for a two-step approach for intervening in the strategy process—an initial emotional screening phase followed by the usual gamut of decision-aiding techniques (cf. Elsbach and Barr, 1999). However, such an arrangement runs the risk of perpetuating the error of separating reason from emotion in the strategy arena (cf. Damasio, 1994). Accordingly, we have sought to demonstrate throughout how some of the fundamental tools of strategizing, when suitably embedded in an emotionally supportive climate, can be adapted to integrate cognition and affect.

Our analysis overall signals the need for a new generation of knowledge elicitation and decision-aiding techniques, predicated on hot cognition principles, for both intervention and research purposes. Rather than focusing on the mapping of strategists' conceptual knowledge *per se* (e.g., Eden and Ackermann, 1998; Hodgkinson, Maule, and Bown, 2004; Huff, 1990), extant cognitive mapping techniques could be modified to elicit and represent feelings and affective reactions to strategic issues and choices, thereby integrating multiple modalities of thought. Such practices could be particularly valuable in helping managers make sense of how they and others react to particular problems, as an aid to sensing, seizing, and transforming.

Techniques commonly used for overcoming decision traps might be similarly adapted to convert them from cold cognition to hot cognition

enhancing technologies. By way of illustration, the frame analysis worksheet (Russo and Schoemaker, 1989) might be adapted to assist decision makers in comprehending the emotional tags they and others hold for a given strategic problem, as a basis for recognizing dissonant reactions to the issues at hand. The goal here would be to enhance multiple frame awareness by incorporating affective information into the exercise.

CONCLUDING REMARKS

In his closing remarks, Teece (2007: 1341) observes that 'enterprises may be more like biological organisms than some economists, managers, and strategy scholars are willing to admit.' Our analysis takes this biological metaphor to a new level by illuminating the ways the individuals and groups who manage these entities are governed by thoughts *and* feelings: always boundedly rational, but manifestly driven by emotion. The continued negation of this fundamental insight risks stymieing the field of strategic management from maturing in alignment with economics and psychology, the base disciplines that have hitherto provided its behavioral microfoundations.

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