

RATIONAL HEURISTICS: THE 'SIMPLE RULES' THAT STRATEGISTS LEARN FROM PROCESS EXPERIENCE

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While much research indicates that organizational processes are learned from experiences, surprisingly little is known about what is actually learned. Using a novel method to measure explicit learning, we track the learned content of six technology-based ventures from three diverse countries as they internationalize. The emergent theoretical framework indicates that firms learn heuristics. These heuristics have a common structure centered on opportunity capture and are learned in a specific developmental order. This results in a deliberately small, yet increasingly strategic, portfolio of heuristics. Broadly, we contribute to the psychological foundations of strategy by highlighting the rationality of heuristics as strategy, capability creation as the cognitive transition from novice to expert heuristics, and simplification cycling as a critical dynamic capability for sustaining competitive advantage. Copyright © 2011 John Wiley & Sons, Ltd.

INTRODUCTION

Organizational processes are central to strategy (Eisenhardt and Martin, 2000; Teece, Pisano, and Shuen, 1997). By 'organizational processes,' we mean actions that accomplish a business task that repeats over time (Pentland and Rueter, 1994). As core features of capabilities, processes such as internationalization (Bingham and Davis, forthcoming; Sapienza *et al.*, 2006), product development (Brown and Eisenhardt, 1997), acquisitions (Graebner, 2004; Vermeulen and Barkema, 2001), and alliances (Hoang and Rothaermel, 2005; Hallen, 2008) enable firms to acquire, shed, and recombine resources. Thus, they facilitate the capture of value-creating opportunities for growth

and profit. Going further, organizational processes actually may be the strategy of firms in unpredictable markets (Bingham, Eisenhardt, and Furr, 2007). By executing these processes well, firms may gain successive competitive advantages and achieve superior performance (Roberts, 1999; Wiggins and Ruefli, 2005). Apple's product development process, 3i's investing process, Cisco's acquisition process, and Starbuck's internationalization process are all examples of effective organizational processes central to the strategy of these successful firms.

The learning literature indicates that firms learn processes from experience (Argote, 1999). Repeat engagement allows firm members to draw inferences and gain insights from the outcomes of their actions. Therefore, as firms repeat processes like acquisitions (Haleblian and Finkelstein, 1999; Vermeulen and Barkema, 2001), internationalization (Barkema, Bell, and Pennings, 1996; Bingham *et al.*, 2007) and alliances (Anand and Khanna, 2000; Ozcan and Eisenhardt, 2009), performance

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is likely to improve. To illustrate, in studying 1,572 alliances across diverse industries, Kale, Dyer, and Singh (2002) find that cumulative alliance experience significantly increased alliance performance as measured by event studies and managerial assessments.

Yet, a striking feature of the learning literature is that it does not directly examine what is learned. Rather, most studies infer learning based on changes in outcomes such as profitability (Haleblian and Finkelstein, 1999), reliability (Haunschild and Sullivan, 2002), quality (Levin, 2000), and productivity (Epple, Argote, and Devadas, 1991). Learning curve studies, for example, often use historical manufacturing data on input labor and capital along with comparable data on cumulative output, where cumulative output proxies for what is learned as firms gain experience. If the coefficient is positive, learning presumably occurred (Argote, 1999). Other studies rely on antecedent-behavior-consequence models of learning (e.g., Haleblian and Finkelstein, 1999; Hayward, 2002). Researchers measure antecedent experience, such as the similarity of a focal acquisition (e.g., measured by four-digit SIC codes), to those completed in the past (Haleblian and Finkelstein, 1999). They then assess its consequence (e.g., performance of the focal acquisition). After combining assessments of antecedents and consequences, they make inferences about whether learning occurred. But, they overlook what was learned. Thus, although research on organizational learning typically theorizes that firms learn from process experience, in practice it usually relies on performance changes to infer learning. The content of what is actually learned is overlooked. Our study addresses this gap.

Specifically, we ask: What do firms explicitly learn as they gain process experience? We focus on explicit learning because of its positive relationship with process performance (Bingham *et al.*, 2007; Szulanski and Jensen, 2006), relevance for firms (can be shared among individuals) (Dyer and Nobeoka, 2000; Kogut and Zander, 1992), and measurability (useful in empirical studies such as ours). We define explicit learning as what firm members collectively articulate as having been learned from their experiences. Given current theory, we use theory-building (Eisenhardt, 1989) and theory-elaboration methods (Lee, 1999). The focal process is internationalization, and the setting is

six entrepreneurial firms with headquarters in Singapore, the U.S., and Finland.

Our study contributes to organizational learning theory and strategy. A core insight is that heuristics constitute ‘rational’ strategy in unpredictable markets. That is, unique rules of thumb that guide key organizational processes are not just cognitive shortcuts. Rather, they are also the basis of value-creating strategies that can be more effective than information-intensive, cognitively demanding approaches. A related contribution is a theoretical framework that opens the ‘black box’ of what is learned from organizational process experience. Firms learn specific types of unique heuristics for capturing opportunities (termed ‘simple rules’) in a developmental order of increasing cognitive sophistication. The result is a small, yet increasingly strategic portfolio of heuristics. This strikingly contrasts with the routines account that dominates the strategy literature. We also join the related, but often unconnected literatures on organizational learning and knowledge. Broadly, we contribute to the psychological foundations of strategy by highlighting: (1) rationality of ‘simple rules’ heuristics; (2) capability creation as a cognitive transition from novice to expert heuristics; and (3) implications of the strategic logic of opportunity for the fundamental questions of strategy—how do firms create and sustain competitive advantage?

THEORETICAL BACKGROUND

Several literatures provide insight into our research question. First, the *organizational knowledge* literature provides a rich tableau of knowledge types that might be learned. Theoretical work proposes knowledge categories such as tacit versus explicit (Grant, 1996; Spender, 1996), transactive knowledge of who knows what (Reagans, Argote, and Brooks, 2005), and procedural versus declarative knowledge (Moorman and Miner, 1998). Empirical work often assumes that firms learn tacit knowledge from process experience and finds benefits when firms make this tacit knowledge explicit (Kale *et al.*, 2002; Kale and Singh, 2007). Making knowledge explicit enhances performance by helping individuals improve their understanding of the process and communicate it throughout the organization (Zollo and Winter, 2002). For example, in a study of 228 acquisitions in the U.S.

banking industry, Zollo and Singh (2004) find that knowledge codification of acquisition experience yields higher performing focal acquisitions as measured by ROA improvement. But, while the knowledge literature usefully identifies knowledge types and finds that making knowledge explicit improves process performance, this work does not assess what knowledge is actually learned. Rather, learning is indirectly measured, such as by whether manuals or checklists exist.

Second, the *organizational routines* literature often argues that firms learn routines from process experience. Routines are patterns of action that form repositories for lessons learned from experience (Feldman, 2000; Levitt and March, 1988; Nelson and Winter, 1982). They often arise in repetitive situations in stable environments where the recurring cost of careful deliberation is high (Cohen and Bacdayan, 1994). Most theoretical work agrees that routines improve the efficiency of task performance by increasing reliability and speed (Cohen *et al.*, 1996; Helfat and Peteraf, 2003; Nelson and Winter, 1982). Empirical work in strategy often invokes routines to explain what is learned when firms accumulate experience with processes such as alliances (Kale *et al.*, 2002) and product development (Eisenhardt and Tabrizi, 1995). For example, Zollo, Reuer, and Singh (2002) examine 145 alliances in the biotechnology industry. They find that the number of previous alliances with the same partner is likely to increase alliance performance for the focal firm. Although the authors do not actually measure the existence of routines, their theoretical argument is that repeated alliance experiences with the same partner enable development of corresponding routines that align incentives, provide monitoring rights, and institute formal controls. A handful of empirical studies of processes do, however, provide more granular descriptions of the content of routines. They argue that routines consist of specific, repeated action steps such as the particular moves in a surgical procedure (Edmondson, Bohmer, and Pisano, 2001) or a simple card game (Cohen and Bacdayan, 1994). These action steps are then elaborated as experience accumulates (Kale *et al.*, 2002). For example, Szulanski and Jensen (2006) report that Mail Boxes Etc. developed 330 action steps in its internationalization process. Yet while the concept of routines is frequently invoked in strategy to theorize about what is learned, and a few studies even measure

steps in a process, the actual content of what is learned is again overlooked.

The *heuristics* literature offers a third lens on what firms might learn from process experience. Heuristics are cognitive shortcuts that emerge when information, time, and processing capacity are limited (Newell and Simon, 1972). As Cohen and colleagues (1996) describe, routines are distinct from heuristics. Routines provide a very detailed, often quasi-automatic response to particular problems that may not be viewed as problems, whereas heuristics provide a common structure for a range of similar problems, but supply few details regarding specific solutions to address them. The well-known ‘heuristics and biases’ research in psychology emphasizes the limitations of heuristics (Ayal and Zakay, 2009; Carlson and Shu, 2007; Tversky and Kahneman, 1974), while the contrasting psychological research on ‘fast and frugal heuristics’ focuses on the superiority of heuristics (DeMiguel, Garlappi, and Uppal, 2009; Gigerenzer, 2008; Taylor, Bennell, and Snook, 2009). But while psychology research typically explores universal heuristics that are common across individuals, several strategy studies anecdotally identify heuristics that are idiosyncratic to particular firms. These includes Yahoo’s rules for alliance formation (Rindova and Kotha, 2001), Intel’s manufacturing rules (Burgelman, 1994), and Omni’s rules for charter change (Galunic and Eisenhardt, 2001). Broadly, Eisenhardt and Sull (2001) conjecture that ‘simple rules’ such as these heuristics enable flexible, yet coherent capture of opportunities addressed by specific processes such as product development and internationalization. These opportunity-capture heuristics consist of boundary rules (which opportunities to pursue), how-to rules (details on how to execute opportunities), priority rules (rank of acceptable opportunities), timing rules (rhythm for executing opportunities), and exit rules (when to drop opportunities).

Recent strategy work extends these arguments. For example, Bingham *et al.* (2007) empirically find that firms with more opportunity-capture heuristics have higher-performing organizational processes. Bingham (2009) further finds that temporal heuristics are especially important for high-performing processes. Similarly, Gary and Wood (2011) find that students who develop accurate heuristics in a manufacturing simulation have high performance. Finally, Davis, Eisenhardt, and Bingham (2009) use simulation to show that a

'simple-rules' strategy of a few heuristics is viable in predictable environments and essential in unpredictable ones. While this work suggests that opportunity-capture heuristics may be what is learned from process experience, it does not provide systematic, longitudinal evidence for what is learned as experience accumulates—e.g., which heuristics are learned, modified, and discarded.

In sum, the knowledge, routines, and heuristics literatures offer possibilities for what is learned from organizational process experience. They indicate that: (1) types of knowledge exist; (2) knowledge learned from process experience is more effective when explicit; and (3) knowledge learned from process experience may include routines and/or heuristics. But, despite the strategic importance of processes, what is learned as experience accumulates is not addressed. Hence, we ask: *What do firms explicitly learn as they gain process experience?*

METHODS

The research design is a multiple-case study that allows replication logic, with each case confirming or not the inferences drawn from the others (Yin, 1994). The research setting is entrepreneurial firms, an attractive one because their young age allows tracking of learning from company inception (thus avoiding left censoring issues) and their small size enables accurate measurement of learning (Argote, 1999). The focal organizational process is internationalization, defined as a firm's physical entry into a foreign country through institutional arrangements (e.g., partnerships and acquisitions) for the primary purpose of enabling sales. Internationalization is an attractive choice because each country entry is a discrete event that can be examined both as a single unit of analysis and as part of a larger set of varied experiences. This allows nuanced examination of what is learned over time.

We studied six entrepreneurial firms from the information technology industry (Table 1).¹ We

¹ These firms are part of a larger study of organizational learning in 12 firms. Consistent with theoretical sampling, we selected the firms here because they reveal our focal phenomenon—i.e., explicit learning across multiple countries entries. The performance implications of explicit learning and why some firms explicitly learn, but others do not are explored in other papers that include more of the study firms (e.g., Bingham *et al.*,

chose this industry because its global scope and growth emphasis suggest that internationalization is an important process (Sapienza *et al.*, 2006; Zahra, Ireland, and Hitt, 2000). We selected firms with headquarters in each of three countries—Singapore, the U.S., and Finland—with diverse cultures to enhance generalizability. We also selected firms with extensive international sales (i.e., more than 50 percent of revenue) to further ensure that internationalization is a key process. We sampled firms that had entered at least four countries and were currently entering at least one additional country at the time of data collection. This combination of retrospective and real-time data is valuable because retrospective data enables more efficient collection of multiple observations of learning (leading to better grounding and external validity), while real-time data collection deepens the understanding of how events evolve (improving internal validity) (Leonard-Barton, 1990). All country entries occurred within four years (most were more recent) of data collection to improve the accuracy of recall of relevant events (Huber and Power, 1985).

Data sources

Our study relies on several data sources including: (1) quantitative and qualitative data from semi-structured interviews with executives; (2) archival data including corporate documents, press releases, and annual reports; (3) observations, including visits to the HQ of each firm; and (4) e-mails, phone calls, and follow-up interviews to track internationalization in real-time and to fill gaps in accounts.

The primary data source is 60- to 90-minute, semi-structured interviews. Approximately 50 interviews were conducted on three continents with two types of informants to provide complementary information on the same events: firm-level executives (e.g., CEO and VP of international) and country-level executives (e.g., country managers and other executives directly involved in a particular country). With firm-level informants, we focused on the company's internationalization history and what was learned across multiple country entries. With country-level informants, we focused on a specific country entry. Together, these two interview types enabled firm-level chronologies

2007; Bingham and Davis, forthcoming; Bingham and Haleblan, forthcoming).

Table 1. Description of cases

| Firm HQ | Product | Sales and employees ² | Year founded | Country entries (in order) | Importance of country entry in firm strategy ³ | Informants | Additional data |
|--------------------------------|--------------------------|----------------------------------|--------------|---|--|--|---|
| F-Meddata Finland | Data capture solutions | \$9.3M 75 | 2000 | Sweden U.S. Czech Rep. Germany U.K. | 'It's vital; it's the cornerstone. Inter-nationalization is the only way to go forward.' | VP of worldwide operations Cofounder and VP of bus. dev. VP of bus. dev. Cofounder/VP of technology | <ul style="list-style-type: none"> - Onsite meetings and observations at corporate HQ in Finland - Discussions with Finnish professor advising TMT - 11 archival documents (press releases, industry articles on firm) - Follow-up interviews with Cofounder |
| F-Supplysoft Finland | Supply chain software | \$93M 495 | 1997 | Sweden Norway France Germany U.K. U.S. | 'Our reason was to become international.' | CEO EVP Deputy CEO VP marketing GM, Germany | <ul style="list-style-type: none"> - Discussions with board of directors chairman - 30 archival documents (press releases, annual and quarterly reports) - Onsite meetings and observations at corporate HQ in Finland - Follow-up interviews with VP marketing |
| U-Analytics U.S. | Real time. CRM analytics | \$8.5M 65 | 1996 | Australia U.K. France Germany Korea | 'Ultimately you need to become global.' | Former chairman VP international Manager, U.K. VP and director of Australia | <ul style="list-style-type: none"> - Discussions with CEO in customer firm - 10 archival documents (press releases) - Onsite meetings and observations at corporate HQ in U.S. - Follow-up interviews with former chairman |

Table 1. (Continued)

| Firm HQ | Product | Sales and employees ² | Year founded | Country entries (in order) | Importance of country entry in firm strategy ³ | Informants | Additional data |
|------------------------|--|----------------------------------|--------------|---|---|--|--|
| U-Semi U.S. | Wireless mobile device chips | \$1 M 100 | 1999 | China Taiwan Korea Japan Germany | 'We were founded from the beginning to be a multisite international company.' | Director of marketing Marketing manager Chairman, CEO, and founder | - 6 archival documents (press releases, white papers, presentations) - Onsite meetings and observations at corporate HQ in U.S. - Follow-up interviews with director of marketing |
| S-Enterprise Singapore | Enterprise software for supply chain integration | \$1.8M 55 | 2000 | Taiwan U.S. Malaysia Japan China Philippines | 'Our business plan has always had an international perspective.' | VP strategic operations President, CEO, and cofounder Cofounder Dir. of bus. dev. | - Discussions with outside board member - 29 archival documents (press releases, industry articles on firm) - Onsite meetings and observations at corporate HQ in Singapore and in U.S. - Follow-up interviews with CEO |
| S-Security Singapore | IT security monitoring | \$3.2M 100 | 2000 | Hong Kong Malaysia Japan China S. Arabia | 'International expansion is key in our expansion plan.' | President, CEO, and cofounder GM, Singapore CEO, Malaysia | - 42 archival documents (press releases, industry articles on firm) - Onsite meetings and observations at corporate HQ in Singapore - Follow-up interviews with CEO |

² Measured at the end of data collection.

³ Examples are representative quotes.

with rich, country-level accounts. We relied on ‘courtroom’ procedure (Eisenhardt, 1989), where we asked informants to step through a timeline of specific behaviors, events, and facts to limit subject bias (Huber, 1985; Miller, Cardinal, and Glick, 1997).

Each interview consisted of three main parts: (1) background information on the firm; (2) event chronology for a specific country entry (country-level interview or, for several entries, firm-level interview); and (3) direct questions related to learning. For the event chronology, we asked open-ended questions that focused on the stream of country entry experiences that occurred (e.g., ‘What did you do initially to gain the first sale?’) and avoided broad speculation that was not grounded in specific actions. We then reviewed the chronology and asked if we had covered all key actions. We concluded the interview with direct questions related to learning such as ‘What, if any, were the lessons gained during this country entry?’ and ‘What, if any, lessons from other country entries were used in this country entry?’ The technique of asking different questions (i.e., nondirective and directive) provides a stronger grounding of theoretical insights and mitigates bias (Eisenhardt, 1989; Bingham *et al.*, 2007). We also sent follow-up emails, added extra interviews as needed, and triangulated interview data with observations and archival data to improve accuracy and completeness.

Data analysis

Consistent with multiple-case analysis (Eisenhardt, 1989), we began by synthesizing the data for each firm into individual case histories. These histories describe the chronology, rationale, mode, team, and order of events for each country entered. We tracked explicit learning in each firm with a comprehensive, emergent approach that is appropriate for theory generation and theory elaboration using case data (Eisenhardt and Graebner, 2007; Lee, 1999). Specifically, we used open- and closed-ended approaches to assess what was explicitly learned and by whom as each firm gained experience with country entries. We focused on explicit learning that informants considered relevant to multiple entries (e.g., ‘use acquisitions to enter new countries’).

We assessed explicit learning from informants’ articulated statements. These statements emerged

in two ways. The first was in response to our open-ended, nondirective request to describe the chronology of country entry events. Here, informants said that the firm learned something relevant for country entry. They typically referred to ‘what we learned’ or ‘what the firm learned,’ meaning learning by the executive team (Daily, Certo, and Dalton, 2000)⁴. The second was in response to our wrap-up questions in the third part of the interview where we directly asked what (if anything) the firm had learned in a focal country entry that was used in other entries, and vice versa. We considered organizational learning to have occurred when two or more informants independently described the same lessons (Table 2). The fact that multiple informants indicated the same lesson learned from experience reflects a collective understanding independent of a specific individual. This understanding is consistent with existing conceptions of organizational learning (Argote and Ophir, 2002; Kim, 1993)⁵. As an important added step in assessing explicit learning, we also used informant country entry chronologies of events to confirm that what firm members said they learned was used in other entries. This involved tracking the use of lessons learned in one country across subsequent country entries.

Once we had developed the individual case histories, we used them for two types of analysis: within-case and cross-case. Within-case analysis centered on uncovering what each firm explicitly learned from its process experience. After we had a good understanding of each case, we then began cross-case analysis. We used charts and

⁴ For example, during their first country entry (Sweden), executives at F-Meddata (Pseudonym: the initial refers to country of origin (F=Finland) and the name reflects the firm product offering) learned the use of entering new countries by sending a young, inexperienced, and inexpensive Finn to ‘cold-call’ local companies from within the country. One cofounder stated, ‘If we were to do the...market entry (for Sweden) again, we would do it the same way—so we would send a low-cost person, train him or her to call the pharma companies and uncover the market intelligence.’ Another executive corroborated: ‘From our experience in Sweden, we came to see that...preparations (for entry) should only be related to finding a suitable person in Finland that can be sent over cheaply to set up an office.’

⁵ This study is appropriately organizational learning because executive teams constitute an entrepreneurial organization’s leadership and set collective understanding for their firms. This designation is also consistent with literature that argues organizational learning is a meaningful construct in entrepreneurial firms because organizational and individual learning are roughly equivalent given the firm’s relatively small number of people and limited structure (Kim, 1993; Zahra *et al.*, 2000).

Table 2. Heuristic portfolios

| Firm | Heuristic | % ⁶ | Type ⁷ | Learned & used ⁸ | | | | | Representative quotes | |
|--------------|---|----------------|-------------------|-----------------------------|---|---|---|---|-----------------------|--|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| F-Meddata | <ul style="list-style-type: none"> ▪ Enter countries with lots of pharma activity ▪ Target pharmaceutical companies ▪ Promote electronic diary solutions to customers ▪ Use standard criteria to qualify customers ▪ Cold calling in host country by aggressive young Finn with a phone book ▪ Hire local salespeople ▪ Use direct sales approach ▪ Ensure active communication among HQ and country employees through company intranet and email lists ▪ Put more emphasis on the U.S. market than other markets ▪ Place greater emphasis on getting Top 20 pharma reference accounts than other reference accounts ▪ Move from small reference accounts to top 20 reference accounts ▪ Qualify customers with template ▪ Create success in major pharma markets (e.g., U.S. and Germany) before entering smaller markets (e.g., Japan) | 100 | Selection | ■ | ○ | ○ | ○ | ○ | ○ | <p>‘We realized that the potential market in the Eastern European countries and with companies based there is very small.’</p> <p>‘We are more specifically looking at their exact study volume by therapeutic area, their related budget...we learned to focus on that particular process on the way, so we did not know earlier.’</p> <p>‘We learned how to know whether the client is buying or not and whether they are serious and have the budget to buy.’ ‘Cold calling, that’s what it was in the very beginning. Also not too senior person because we didn’t want to spend too much money.’</p> <p>‘We saw that pharma is global and U.S. driven. So we decided that we need to be U.S. driven...’</p> |
| | | 100 | Selection | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 100 | Selection | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 50 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 100 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 75 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 75 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 50 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 100 | Priority | ■ | ■ | ○ | ○ | ○ | ○ | |
| | | 75 | Priority | ■ | ■ | ○ | ○ | ○ | ○ | |
| 50 | Temporal | ■ | ■ | ○ | ○ | ○ | ○ | | | |
| 75 | Procedural | ■ | ■ | ■ | ○ | ○ | ○ | | | |
| 100 | Temporal | ■ | ■ | ■ | ■ | ○ | ○ | | | |
| F-Supplysoft | <ul style="list-style-type: none"> ▪ Restrict internationalization to Scandinavia ▪ Target wholesalers and independent retailers ▪ Push enterprise software ▪ Enter new countries through acquisitions (becomes elaborated in next entries) ▪ Focus on three items in sales approach: reduce stock, control inventory, and improve replenishment process ▪ Use direct sales to approach customers ▪ Ensure pre-acquisition integration with target executives (becomes elaborated in next entries) ▪ Hire a local country manager ▪ Localize sales and marketing | 80 | Selection | ■ | ○ | ○ | ○ | ○ | ○ | <p>‘I remember when all these analysts were blaming us, that we are too conservative because the markets are in the U.S. So we started with Sweden, which is closest here. I said that we have to have the learning process.’</p> <p>‘We noticed that Finland is about two to three years ahead of Sweden in the development of retail industry, and Norway is two to three years behind Sweden.’</p> <p>‘We developed a time table. We take one continent at a time...If the U.S. is going as planned, then we start in China. If it comes slower, then China comes later.’</p> |
| | | 100 | Selection | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 100 | Selection | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 80 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 60 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 60 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 60 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 80 | Procedural | ■ | ○ | ○ | ○ | ○ | ○ | |

| | | | | | | | | |
|-------------|--|---|---|---|---|---|---|--|
| | <ul style="list-style-type: none"> ▪ Synchronize sales based on retail industry lifecycle ▪ Stay more focused on Scandinavian markets than other markets ▪ Create stepping-stones to larger markets (France, Germany, U.K.) ▪ Place emphasis on grocery segment of retail markets ▪ Choose countries with large domestic markets ▪ Take one continent at a time (i.e., build Europe, move to U.S., then China) | 40 | Procedural | <ul style="list-style-type: none"> ■ ■ ■ ■ ■ ■ | <ul style="list-style-type: none"> ○ ○ ○ ■ ○ ■ | <ul style="list-style-type: none"> ○ ○ ○ ○ ○ ○ | <ul style="list-style-type: none"> ○ ○ ○ ○ ○ ○ | <p>‘There were a lot of lessons learned with end customers (in the U.S.). They have their way of doing things, and we didn’t really have experience of that here in Europe, so we had to integrate and learn their way of doing things.’</p> |
| U-Analytics | <ul style="list-style-type: none"> ▪ Restrict internationalization to English-speaking markets ▪ Target large enterprises ▪ Sell real-time analytics ▪ Focus on a features selling approach that highlights detail and functions of technology ▪ Use direct sales ▪ Work with experienced local country manager ▪ Use implementation partners ▪ Create a strong HQ liaison for each country ▪ Use U.K. as launching pad into large markets in continental Europe ▪ Solidify the organization in the current entry, then enter the next ▪ Emphasize low costs serendipitous mode to enter new countries over other higher cost modes (e.g., greenfield, acquisition) | 75 100 100 50 100 100 100 50 50 50 75 | <ul style="list-style-type: none"> Selection Selection Selection Procedural Procedural Procedural Procedural Temporal Temporal Priority | <ul style="list-style-type: none"> ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ | <ul style="list-style-type: none"> ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ | <ul style="list-style-type: none"> ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ | <ul style="list-style-type: none"> ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ | <p>‘We decided that we were going to attack the English-speaking markets.’</p> <p>‘The U.K. was also the hub for a planned launch into France and Germany.’</p> <p>‘(TMT) learned that a lot of what they were doing in the States was not what we wanted to do in the U.K. They had not been overly partner centric in the States. They tried to do a lot of the things themselves. They had no fundamental data-market partner with a domain expertise that was really necessary to make the difference... We set out in the U.K. to look for implementation partners that had domain expertise that would help us build the value proposition.’</p> |
| U-Semi | <ul style="list-style-type: none"> ▪ Enter countries that have original device manufacturers (ODMs) and original equipment manufacturers (OEMs) ▪ Sell turnkey semiconductor solutions | 100 100 | <ul style="list-style-type: none"> Selection Selection | <ul style="list-style-type: none"> ■ ■ | <ul style="list-style-type: none"> ○ ○ | <ul style="list-style-type: none"> ○ ○ | <ul style="list-style-type: none"> ○ ○ | <p>‘The design activity and manufacturing activity are in China... in the past, we thought the product was designed in Taiwan and manufactured in China.’</p> |

Table 2. (Continued)

| Firm | Heuristic | % ⁶ | Type ⁷ | Learned & used ⁸ | | | | | Representative quotes | |
|--------------|---|----------------|-------------------|-----------------------------|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | | |
| S-Enterprise | <ul style="list-style-type: none"> ▪ Use China for both design and manufacturing of chips ▪ Use consultant to provide insight about local market and develop relationships with distributors ▪ Use direct sales ▪ Emphasize low cost ▪ In the sales pitch, emphasize track record of CEO (elaborated during later entries) ▪ Create partnerships with other chipset and software providers in order to supply a total solution ▪ Focus efforts on tier-one countries versus other tiers ▪ Move from tier-three to tier-two to tier-one countries ▪ Within the tier-three and tier-two countries, develop and validate products in Taiwan first, then in Korea, and then take them to China ▪ Synchronize sales approach to local culture ▪ Start first with auto, then PDA, then mobile handset ▪ Pace new chip features according to one-year auto industry design cycle | 67 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | ○ | <p>‘Our experience clearly showed us that we needed to provide the total solution. We are not going into any country just having a chip and saying ‘here’s our datasheet, good luck.’</p> <p>‘So our marketing strategy has been trying to get the credible players from the tier-two, tier-three countries...then you leverage that to get into the tier-one in Japan, Germany, and North America.’</p> <p>‘We learned that it would be tougher to get...handset providers in the short term. So, we’re starting with automotive.’</p> <p>‘We discovered that Germany is between Korea and Taiwan, and Japan in terms of rigorosity. After talking with the Japanese...they move a little quicker in Germany.’</p> |
| | | 67 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 100 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 100 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 67 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | ○ | |
| | | 100 | <i>Procedural</i> | ■ | ■ | ○ | ○ | ○ | ○ | |
| | | 100 | <i>Priority</i> | ■ | ■ | ○ | ○ | ○ | ○ | |
| | | 67 | <i>Temporal</i> | ■ | ■ | ○ | ○ | ○ | ○ | |
| | | 67 | <i>Temporal</i> | ■ | ■ | ○ | ○ | ○ | ○ | |
| | | 100 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | ○ | |
| 67 | <i>Temporal</i> | ■ | ○ | ■ | ○ | ○ | ○ | | | |
| 67 | <i>Temporal</i> | ■ | ○ | ○ | ○ | ■ | ○ | | | |
| 75 | <i>Selection</i> | 75 | <i>Selection</i> | ■ | ○ | ○ | ○ | ○ | <p>‘(Based on our experience) we started shifting away from a direct sales model to an indirect model, to work through partners.’</p> <p>‘We saw that the Japanese buyers won’t buy unless the American buyers buy. There’s this whole pecking order of nations.’</p> <p>‘We realized that it was important to have an American base.’</p> <p>‘Working in Malaysia helped focus our partnership strategy a lot more. To focus on building the business case first.’</p> <p>‘We decided to use a partner first...then we’ll service customers directly.’</p> <p>‘In all the countries where we go (standard) is always the entry point for us...we learned</p> | |
| 100 | <i>Selection</i> | 100 | <i>Selection</i> | ■ | ○ | ○ | ○ | ○ | | |
| 100 | <i>Selection</i> | 100 | <i>Selection</i> | ■ | ○ | ○ | ○ | ○ | | |
| 100 | <i>Procedural</i> | 100 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | | |
| 75 | <i>Procedural</i> | 75 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | | |
| 75 | <i>Procedural</i> | 75 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | | |
| 100 | <i>Procedural</i> | 100 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | | |
| 75 | <i>Procedural</i> | 75 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | | |
| 75 | <i>Priority</i> | 75 | <i>Priority</i> | ■ | ○ | ○ | ○ | ○ | | |
| 100 | <i>Priority</i> | 100 | <i>Priority</i> | ■ | ○ | ○ | ○ | ○ | | |
| 50 | <i>Procedural</i> | 50 | <i>Procedural</i> | ■ | ○ | ○ | ○ | ○ | | |

| | | | | | | | | |
|------------|---|--|--|---|--|---|--|---|
| | <ul style="list-style-type: none"> Synchronize entry based on market readiness Enter U.S. market and then use U.S. reference accounts to enter Japan and then rest of Asia Introduce new products in Singapore first Sell through partners first and then build a direct channel | 50 75 75 50 | Procedural <i>Temporal</i> Temporal Temporal | ■ ■ ○ ○ ○ ○ ■ ■ | ○ ○ ○ ○ ○ ○ ○ ○ | ○ ○ ○ ○ ○ ○ ○ ○ | ○ ○ ○ ○ ○ ○ ○ ○ | that when you embrace a common standard, your processes are similar, country to country. ⁶ |
| S-Security | <ul style="list-style-type: none"> Restrict internationalization to Asia Sell to government agencies and banks Sell 24 × 7 security service monitoring Use JV partnerships with large mature local firms Target the audit group within customer organizations to get sales Focus on a consultative sales approach when entering new countries Place more emphasis on China than other countries Hire an experienced local country manager Leverage Singapore bank contacts to get deals Synchronize sales approach with country IT life cycle Use Hong Kong as a springboard to enter larger future markets, including China and Taiwan Place more priority on 24 × 7 monitoring than security systems integration Place greatest priority on government accounts Sell to organizations with extensive proprietary data and ability to pay Synchronize entry with pace of macro economy Enter one country at a time | 100 100 100 67 67 67 67 67 67 67 67 67 67 100 100 100 | Selection <i>Selection</i> <i>Procedural</i> <i>Procedural</i> <i>Procedural</i> <i>Priority</i> Procedural Procedural Procedural <i>Temporal</i> Priority Priority Procedural Temporal | ○ ■ ■ ■ ■ ■ ■ | ○ ■ ■ | ○ ■ ■ | <p>‘We learned from experience who is our buyer, who makes the decision. The auditors of governments and banks instead of IT. In more and more of the organizations, the IT security is out of IT. The budget is not in IT—it is part of risk management. . .So we changed according to the market. . .It was not this way a few years ago.’</p> <p>‘Look at who cherishes the information more. If we talk to small solo enterprises, they don’t even bother, but banks and government care.’</p> <p>‘When we go in. . .We must have a local partner to work with us.’</p> <p>‘Hong Kong is the stepping stone into China and Taiwan.’</p> <p>‘We decided we need to start in one country, make it work, and then replicate.’</p> | |

⁶ Percent of informants who reported that this heuristic was learned.
⁷ Italics indicate country entry where this heuristic type was first learned.
⁸ Country entry where heuristic was learned and subsequently used (1-5= country entry number). ■ indicates where learned and ○ indicates where subsequently used.

tables to look for the emergence of similar themes across multiple cases (Eisenhardt, 1989). From the emerging patterns, we formed tentative theoretical constructs and propositions. We then refined them through replication logic, frequently revisiting the data to compare and verify systematically the occurrence of specific themes within each case. We were aware of the prior literatures on knowledge types, routines, and heuristics, so we examined the data for the emergence of these construct categories. But, we also looked for unexpected types of explicit learned content and relationships. Thus, we combined theory elaboration (Lee, 1999) and theory generation (Eisenhardt, 1989) in our analysis. We then iterated between theory and data to clarify our findings and theoretical arguments. We also introduced related research from fields such as cognitive science and psychology into these iterations to sharpen our construct definitions and enhance the theoretical arguments, internal validity, and generalizability (Eisenhardt and Graebner, 2007). Together, these activities helped us produce the theoretical framework.

WHAT FIRMS EXPLICITLY LEARN FROM PROCESS EXPERIENCE

Initiating heuristic portfolios

Strategy research often infers that firms learn routines from their accumulated experience with organizational processes (Kale *et al.*, 2002; Nelson and Winter, 1982; Zollo *et al.*, 2002). In contrast, we find that firms learn *portfolios of heuristics*, so we confirm the conjectures of Eisenhardt and Sull (2001) with systematic, longitudinal data. Specifically, firms learn particular types of heuristics that focus on successfully capturing country entry opportunities. That is, consistent with the distinctions of Cohen *et al.* (1996), firms learn a common rule structure for a range of similar country entry problems (heuristics), but do not learn extensive details and precise steps to be applied consistently in every country entry (routines)⁹. Unexpectedly,

⁹ There is much debate about heuristics as distinct from routines versus a type of routine. Following Cohen *et al.* (1996), we distinguish heuristics and routines because they differ in their amount of structure, range of problems addressed, cognitive engagement, repeatability of outcomes, and relevance to strategic (e.g., important, infrequent, heterogeneous, unpredictable) actions. But regardless of how broadly they define routines, most strategy scholars agree that heuristics and routines as described

firms initiate their heuristic portfolios with particular heuristics—*selection* and *procedural*.

We define *selection heuristics* as deliberate rules of thumb for guiding which sets of product or market opportunities to pursue (and which to ignore). Similar to Eisenhardt and Sull (2001), we coded heuristics as ‘selection’ if they specified particular countries or geographic regions to enter, products to sell, or customer types to address. We define *procedural heuristics* as deliberate rules of thumb for guiding the execution of a selected opportunity. We coded heuristics as ‘procedural’ if they specified country entry mode or an approach to functions like sales, design, staffing, or pricing policy. All six firms developed selection and procedural heuristics in their first country entry (Table 2).

A good example is U-Semi, a U.S.-based firm that creates semiconductor solutions for GPS-enabled mobile devices. Prior to entering their first country (China), executives planned to use Taiwan for the design layout of the firm’s chips and China for manufacturing. As one executive stated, ‘*Initially, we thought the product should be designed in Taiwan and manufactured in China because of the cheap labor.*’ But after entering China, the executive team realized China was important for both manufacturing and design. The CEO noted, ‘*We gradually discovered that even if they have R&D, most of the big Taiwanese companies also have their R&D centers in China. So actually what we found out is that our design activity should be in China and the manufacturing should also be in China.*’ This learning prompted the executive team to create a procedural heuristic: use China for both design and manufacturing (Table 2). Later a team member confirmed, ‘*Our design activity and manufacturing are both in China.*’ Firm members used this heuristic to guide the execution of subsequent country entries.

Executives also learned other selection and procedural heuristics in China. When the firm first entered China, executives believed they should sell just their semiconductor products. But after several months of no sales, they realized that potential Chinese customers had weak engineering skills that prevented them from exploiting the cutting-edge technology of U-Semi’s chips. The CEO said, ‘*We found that in China, they (customers) didn’t have much of a design process. You had to finish the*

by Cohen *et al.* (1996) are distinct. We appreciate the encouragement of an anonymous reviewer to address this distinction.

whole design for them before they could use it. Therefore, the executive team decided that instead of selling only chips, they would sell turnkey solutions (selection heuristic). One member noted: *'Our experience clearly showed us that we needed to provide the total solution. We are not going into any country just having a chip and saying 'Here's our datasheet. Good luck!'*

Another example is S-Security, a Singapore-based security software firm. During S-Security's pre-internationalization experience in Singapore, management was successful in targeting government agencies and banks and focusing on a technology 'features' sales approach directed at IT managers. The executive team decided to focus on the same customer (government agencies and banks) and use the same sales approach (features 'sell' to IT managers) when entering their first country—Hong Kong. After the firm's entry however, the CEO realized selling to IT managers was not working. Since new financial guidelines in several Asian countries required senior executives to understand information risks, many Hong Kong companies had shifted responsibility for information security from IT to audit. As the CEO said, *'We learned from experience who is our buyer, who makes the decision—it's auditors instead of IT. In more and more of the organizations, IT security is out of IT. The budget is not in IT—it is part of risk management. So we changed according to the market.'* Thus, the executive team learned a selection heuristic: target the audit group within customer organizations to get sales.

Similarly, when trying to close sales, the CEO discovered the 'features' sales approach that had worked in Singapore yielded few sales in Hong Kong. Instead, he observed that Hong Kong firms preferred a 'consultative' approach with customized solutions to match their unique needs, noting, *'It's consultative selling, meaning that it's not 'Hey, this is a very good technology.'*" This mistake prompted the executive team to start using a consultative sales approach (procedural heuristic). The firm used these heuristics to guide subsequent country entries and, in doing so, avoided repeating the selection and procedural errors of Hong Kong. As the CEO remarked, *'Malaysia is one year later than Hong Kong, so we didn't make the same mistakes.'*

Overall, we find that firms explicitly learn heuristics as they begin their process experience. But since heuristics are often seen as dysfunctional

(Busenitz and Barney, 1997; Carlson and Shu, 2007; Kahneman and Tversky, 1973; Holcomb *et al.*, 2009), it is important to clarify why firms learn heuristics. One reason may be that heuristics are useful when time is short, information is limited, and the situation is novel (Newell and Simon, 1972). Heuristics speed action by requiring less information and simplifying cognitive processes. Consistent with this argument, we observed, for example, that when a third party in Australia contacted U-Analytics to encourage entry, executives used their selection heuristic of 'restrict internationalization to English-speaking markets' to respond swiftly even though they knew little about Australia. As a VP said, *'We'd already decided that we're going to attack the English-speaking markets and so it (Australia) was just too good an opportunity to miss.'*

A subtler reason firms may learn heuristics is that they are often surprisingly accurate. Research on 'fast and frugal' heuristics (Gigerenzer and Brighton, 2009; Goldstein and Gigerenzer, 2009) finds that simple heuristics can outperform analytically complicated and information-intensive approaches even when information and time are available. Heuristics are often accurate because they exploit information about context that individuals have, an attribute that laboratory-based research on 'heuristics and biases' usually lacks. Individuals seem to learn simple heuristics that fit with their understanding of the context and correlate with other information that also influences outcomes (Gigerenzer, 2008; Wilson and Schooler, 1991). The 'English-speaking markets' heuristic at U-Analytics, for example, takes advantage of a founder's U.K. rearing and familiarity with the British Commonwealth (most English-speaking countries) culture and so proxies for other useful information. This heuristic provided helpful guidance even though the founder could not anticipate what specific information would be useful. By contrast, analytically complex, information-intensive approaches may underperform because they 'overfit' experience, ineffectively weight diverse information, and do not exploit actors' knowledge of the situation (Goldstein and Gigerenzer, 2009). For example, investors using a single heuristic (invest equally in all asset classes) outperformed investment policies that relied on substantially more information, analysis, and computation (DeMiguel *et al.*, 2009), while individuals using a single heuristic (take the midpoint between the two most

distant crime scenes) solved serial crimes more quickly and accurately than a complex computational approach (Taylor *et al.*, 2009).

Firms may also learn heuristics because they are easy to remember and improve. As cognitive science research indicates (Baddeley and Hitch, 1974; Cowan, 2001), knowledge retention is enhanced when lessons are simple because the significant capacity limits of short-term memory importantly restrict the amount of information that can be encoded in long-term memory. Without encoding, lessons are forgotten (Anderson, 2000; Craik and Lockhart, 1972). Simplicity also makes improving heuristics easier because it is easier to process feedback when actions are transparent and understood. Simplicity is particularly advantageous for organizational learning because individuals are better able to convey simple lessons and recipients are better able to remember them. As one cofounder described his firm's heuristics, '*It's not really coded anywhere. It's been diffused in the company, so it gets into everybody's head.*'

Unexpectedly, firms initially learn *selection and procedural* heuristics. This finding is important because prior literature does not anticipate that particular heuristics are learned first. It is also important because it emphasizes that heuristics relate to specific problem-solving contexts. So while prior research identifies universal heuristics such as anchoring (Tversky and Kahneman, 1974) and take-the-best (Gigerenzer and Goldstein, 1999) that individuals use to solve binary choice problems with correct answers (e.g., Does Cologne have a bigger population than Bonn?), we find selection and procedural heuristics that firms uniquely learn to help solve the common problem addressed by organizational processes—i.e., successful opportunity capture in an abundant flow of related yet heterogeneous opportunities. For example, Cisco's acquisition process attempts to make high-performing acquisitions from a large pool of heterogeneous, potential acquisitions. Similarly, our firms attempt to make effective country entries from a large pool of heterogeneous country entry opportunities. Selection heuristics help firms cope with this abundance by constraining the range of opportunities. For example, S-Security's selection heuristic of 'restrict internationalization to Asia' restricts the choice of countries. Similarly, procedural heuristics constrain how country entries should be made. While firms could flexibly improve all facets of every entry, this would be slow

and prone to mistakes. Thus, procedural heuristics speed entry, conserve attention, and improve reliability of opportunity capture by giving coherent guidance about entry without specifying precise details. In summary, we propose:

Proposition 1: When firms engage in repeated process experience, they initially learn selection and procedural heuristics for capturing opportunities.

Adding temporal and priority heuristics

Knowledge research identifies the importance of declarative and procedural knowledge categories (Grant, 1996; Moorman and Miner, 1998; Reagans *et al.*, 2005). We also find that firms learn these knowledge types in their selection and procedural heuristics, respectively. But surprisingly, our firms also learn *priority* and *temporal* heuristics that focus on different knowledge. There are two unexpected findings. One is an expanded conception of temporal heuristics to include sequence and pace, not just rhythm. The other is *developmental order*—i.e., firms learn temporal and priority heuristics *after* they begin to learn selection and procedural heuristics.

We define *temporal heuristics* as deliberate rules of thumb for opportunity capture that relate to time. We coded heuristics as 'temporal' when they relate to time, such as sequence (e.g., order of approaching customer types), pace (e.g., complete one entry before beginning the next), and rhythm (e.g., number of entries per year). We define *priority heuristics* as deliberate rules of thumb that rank opportunities. We coded heuristics as 'priority' if they rank some acceptable opportunities as more important than others (e.g., preference ranking of some customers among all acceptable customers). All six firms began to learn temporal and priority heuristics *after* they started learning selection and procedural ones. Thus, heuristics are unexpectedly learned in a specific development order (Table 2).

To illustrate, U-Semi began to learn temporal and priority heuristics after selection and procedural ones. The executive team learned during their second country entry (Taiwan) that the firm should emphasize 'tier-one' countries (e.g., Japan, Germany, U.S.) over other countries with original device manufacturers (ODMs) and original equipment manufacturers (OEMs) (priority heuristic) because tier-one countries have the largest

domestic markets for the mobile applications targeted by U-Semi's products. But, the team also realized entering tier-one countries immediately would be challenging because the firm lacked credibility. The sales vice president noted, *'We started right off and tried to talk to Dell (U.S. tier-one). They wouldn't give us the time of day. They won't take you seriously until they see a validated platform.'* Based on this knowledge, executives decided the firm should (1) sell in 'tier-three' countries like Taiwan and then (2) use those reference accounts to gain customers in 'tier-two' countries like Korea. After gaining 'tier-two' customers, the firm should then (3) use those accounts to enter 'tier-one' countries like Japan (temporal heuristic: move from tier-three to tier-two to tier-one countries). The vice president summarized, *'Our marketing strategy has been trying to get the credible players from the tier-three, then tier-two countries—the big fish in the small pond like Hyundai in Korea and BenQ in Taiwan. If they adopt your platform and you ship in mass production, then you leverage that to get into the tier-ones in Japan, Germany, and North America.'* The firm used this heuristic to guide subsequent country entries.

U-Semi also learned other temporal heuristics. The executive team learned in their fourth entry (Japan) to sequence new product introductions by country (i.e., first Taiwan, then Korea, then China), and to sequence their selling efforts by industry sector within a country (e.g., first auto, then PDA, then mobile handset). The former sequence was based on decreasing engineering skill. The latter was based on increasing market rivalry. As one executive explained, *'We learned that it is much tougher to get the handset providers in the short term. So we're starting with auto.'*

A second illustration is S-Enterprise. The executive team began to learn temporal and priority heuristics after they began to learn selection and procedural heuristics in Taiwan (first country). After their entry into Taiwan, they decided that Japan should be their highest priority Asian country (priority heuristic) because they saw in their Taiwanese experience that many customer trends begin in Japan. But as they probed for early customers in Japan, executive team members realized Japanese customers were not interested in buying unless the firm had U.S. references. A founder stated:

'Japanese customers did not respect us when we said that we were a Singaporean company. I think it is a prejudice on their part. Japan looks to the U.S. as being at the forefront of technology, but not to the rest of Asia. They see themselves foremost in Asia. It can't possibly be that this small company from Southeast Asia has technology that we don't have.'

To address what executives termed the *'pecking order of nations,'* they decided to sequence their country entries: (1) first enter the U.S., (2) use U.S. customers as references to enter Japan, and then (3) use Japanese customers as references for entry into the rest of Asia (temporal heuristic). A founder noted the counterintuitive sequence of expanding outside Asia to expand further in Asia: *'If you go to Japan, you first have to have success in the U.S. If you have success in Singapore (headquarters country) and you go to Japan, you may not be able to sell. So it means that you have to have success in the U.S., then you go to Japan, and then from Japan you can go elsewhere in Asia.'* The value of this temporal heuristic was later confirmed as an executive noted: *'Their (Japanese customers) faces changed when we said we were a U.S. company and started giving out the Inc. business card. They were much more receptive then.'*

S-Enterprise executives also added priority heuristics. The founders noticed business activity around a new standard, Rosetta Net, in their home country of Singapore and their first country (Taiwan). But, they did not understand the implications of this standard when they entered their second and third countries (U.S. and Japan) where Rosetta Net was less actively promoted. They then realized that, within Asian countries (selection heuristic), it was advantageous to *'ride on the coattails of this new international standard'* because selling in countries with Rosetta Net activity took advantage of S-Enterprise's understanding of the standard from Singapore and Taiwan and signaled the likely existence of a sophisticated customer base in the country that would buy S-Enterprise's leading-edge products. So, they added a priority heuristic such that they continued to enter Asian countries (selection heuristic) but with a preference for Asian countries that actively promoted Rosetta Net (priority heuristic). One team member stated, *'Rosetta Net is the entry point for us. We*

learned that when you embrace a common standard, your processes are similar, country to country.' Thus, when deciding their fourth country entry, executives quickly converged on Malaysia because Rosetta Net had recently opened an office there. The CEO explained, 'We saw the opportunity with this new standard being taught to Malaysia. That's why we started moving in.' Another executive member concurred, 'Malaysia happened to have a strong enough consumer base that they embraced the (Rosetta Net) standard. So it was a natural next step for us.'

Overall, we find that firms explicitly learn temporal and priority heuristics. This further emphasizes the key point that heuristics relate to specific problem-solving contexts. Similar to the prior heuristics, these heuristics relate to the common problem of organizational processes—i.e., successful opportunity capture in an abundant flow of heterogeneous opportunities. Heterogeneity suggests that some opportunities may be more attractive (e.g., higher growth). Priority heuristics guide executives to avoid lower-value (albeit acceptable) opportunities when higher-value ones exist. Heterogeneity also suggests opportunities may have features (e.g., customer engineering before sales call) that make temporal heuristics helpful for sequencing activities. Also, since opportunity capture often requires internal coordination of limited resources, heuristics that set a rhythm or pace can be especially advantageous (Brown and Eisenhardt, 1997; Vermeulen and Barkema, 2002). For example, as F-Supplysoft's CEO explained, 'We have a timetable. We take one continent at a time. So, if the U.S. (current North American entry) goes as planned, then we start in China. If not, we delay China.'

More intriguing, our data also indicate a *developmental order*—firms begin to learn temporal and priority heuristics *after* they begin to learn procedural and selection heuristics. This is significant because it indicates an unexpected phased development of heuristics. One reason for this development is that temporal and priority heuristics involve relationships among opportunities and so require more experience to learn. Firm members often need to learn about single opportunities before they can relate those opportunities to one another by ranking or sequencing them. In contrast, selection and procedural heuristics relate to single opportunities and so require less experience to learn (Table 3).

A less obvious reason may be heuristics that involve relationships among opportunities require not only more experience, but also more cognitive sophistication to learn. Individuals must simultaneously keep in mind information about several experiences while making cognitive links among them. For example, S-Enterprise executives solidified their heuristic to focus on Asian countries (selection heuristic) early on. But they did not learn their preference for selling in Rosetta Net countries (priority heuristic) until after they had experienced selling in both Rosetta Net and non-Rosetta Net countries and had made cognitive links among different entry experiences to determine benefits of the Rosetta Net standard for country entry.

A related reason for this development order is that temporal heuristics, in particular, are likely to be learned later because explicit knowledge about time is often abstracted from experiences that happen first (Boltz, Kupperman, and Dunne, 1998). That is, temporal knowledge often builds on nontemporal knowledge (Zakay and Block, 1998) and links together implications of experiences that occur in different time frames. For example, U-Semi executives had to first learn through experiences in several countries that they faced many more commercial rivals in some customer industries (e.g., mobile handsets) than others (e.g., autos). It was only after they had learned these lessons and developed sufficient cognitive understanding of their implications that they were able to learn a temporal heuristic for sequencing customer types (i.e., first auto, then PDA, then mobile handset). In general, our findings are consistent with cognitive science research that shows temporal concepts are learned after nontemporal ones (Fraisse, 1982; Hambrick and Engle, 2002).

Overall, this developmental order is consistent with cognitive science research on experts. This work finds that novices become experts through experience (Chase and Simon, 1973; Feltoich, Prietula, and Ericsson, 2006). Moreover, experts such as chess masters are able to hold in mind multiple actions simultaneously while novices cannot (de Groot, 1978; Ericsson and Kintsch, 1995). Experts also think in terms of relationships among features like priorities and sequences and integrate past and future time frames while novices focus on isolated features in the present (Ericsson, Patel, and Kintsch, 2000; Friedman, 2000; North *et al.*, 2009). For example, expert firefighters interpret a fire scene by what preceded and what events are likely

Table 3. Characteristics of opportunity-capture heuristics

| Type | Selection | Procedural | Priority | Temporal |
|--------------------------|--|---|--|---|
| Definition | Rules of thumb that guide the choice of opportunities (i.e., which opportunity sets to pursue and which to ignore) | Rules of thumb detailing the actions to execute a particular opportunity within a selected set | Rules of thumb that specify the ranking of opportunities or actions within a selected set | Rules of thumb that relate to timing of opportunities or actions such as sequence, rhythm, or pace |
| Examples | <ul style="list-style-type: none"> Restrict internationalization to Europe Only enter English-speaking markets Target wholesalers and independent retailers Enter countries that have ODMs and OEMs | <ul style="list-style-type: none"> Use direct sales approach Use acquisitions to enter new countries Use implementation partners Use greenfield entry mode | <ul style="list-style-type: none"> Stay more focused on Scandinavian markets than other markets Place more emphasis on 24 × 7 monitoring than security systems integration Put greatest emphasis on Japanese market within Asia Place greatest priority on government accounts | <ul style="list-style-type: none"> Enter one continent at a time Use U.K. as launching pad into large markets in continental Europe Move from tier-three to tier-two to tier-one countries Sell through partners first, then build a direct channel |
| Cognitive sophistication | Lower order: Does not require understanding of how multiple opportunities relate. Rather, heuristic centers on selection of one focal opportunity. | Lower order: Creation does not require in-depth evaluation of how actions interrelate over time. Like selection heuristics, focus is on one focal opportunity. | Higher order: Creation requires thoughtful evaluation and comparison of multiple opportunities and/or actions so as to select better opportunities and actions first. | Higher order: Creation requires understanding of rhythms, sequences, and time required such that firms can link multiple opportunities and/or actions together. |
| Why important | Helps executives allocate scarce resources to an advantageous opportunity set. Without selection heuristics, leaders may chase too many opportunities, or chase poor opportunities, or become confused about which opportunities to pursue and so do nothing | Helps executives organize their actions to execute the opportunity. Without procedural heuristics, leaders may increase time for decision making due to lack of coherence or understanding regarding the execution of opportunities. Mistakes may increase. | Targets organizational efforts on most attractive opportunities within selected sets. Without priority heuristics, leaders may pursue lower-value opportunities when higher-value opportunities within the set exist. | Helps regulate tempo and maintain momentum of actions so as to avoid misalignment and wasted effort. Without temporal heuristics, leaders may execute actions in the wrong order. Or they may not switch well from one opportunity to another. |

to follow while novices focus on immediate features like color and intensity (Klein, 1998). Thus, later learning of temporal and priority heuristics is consistent with transition from ‘novice’ to ‘expert.’ In sum, we propose:

Proposition 2: Temporal and priority heuristics are learned after selection and procedural heuristics.

Engaging in simplification cycling

Much research argues that routines improve task efficiency by enhancing speed and reliability (Davis *et al.*, 2009; Helfat and Peteraf, 2003; Nelson and Winter, 1982). As firms gain experience with routines, they elaborate them to accommodate added lessons and so develop an increasingly reliable and complete set of action steps (Eisenhardt and Tabrizi, 1995; Kale and Singh, 2007; Szulanski and Jensen, 2006). In contrast, we observe both elaboration *and* simplification. Specifically, our data show that as firms manage the content of what they explicitly learn by developing more and higher-order heuristics, they also manage the complexity of what they explicitly learn with *simplification cycling*.

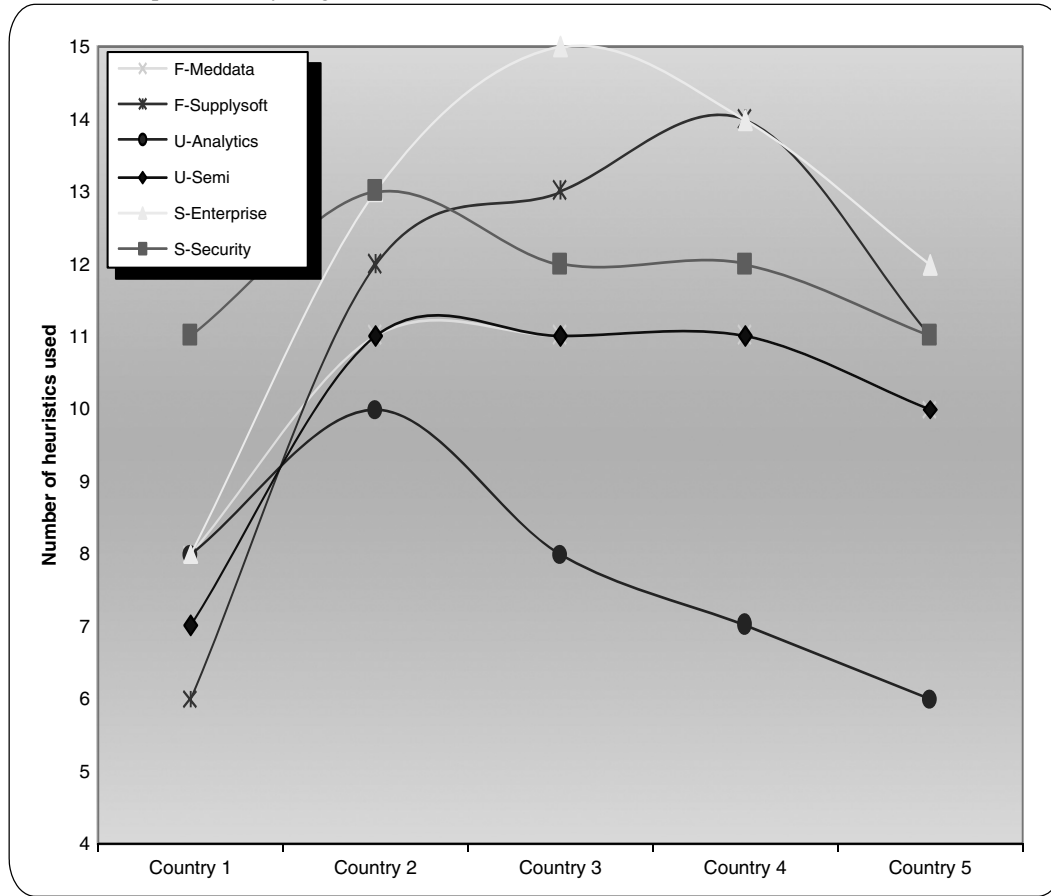
Simplification cycling exhibits two patterns that emerge from the data: the first pattern, elaboration, was expected. Consistent with prior research (Kale *et al.*, 2002; Sapienza *et al.*, 2006), executive teams elaborate the number and detail of country entry heuristics as they gain experience. This creates more current, comprehensive heuristic portfolios. The second pattern, simplification, was *not* expected. Executive teams purposefully simplify their heuristic portfolios by pruning heuristics as they gain experience. We assessed simplification cycling by tracking the addition and deletion of heuristics over time. All six firms engaged in simplification cycling—i.e., they began with a few heuristics, added more, replaced some, and subtracted others (Table 4).

An example is F-Supplysoft, a Finnish firm selling point of sale software to help retailers manage inventory. The executive team created several heuristics during their first country entry (Sweden). One was a procedural heuristic specifying entry mode - ‘enter new countries through acquisition’. Based on their Swedish success, executives realized that relying on acquisitions would offer benefits like gaining quick access to employees

who would know how to conduct business in the local market. As the CEO stated, ‘*Our idea was first of all to buy (a firm to enter a country).*’ During their second entry (Norway), the executive team created another procedural heuristic related to acquisition. Upon reflection, team members realized that another key to their Swedish success was the enthusiastic support of acquired senior managers. So, in addition to their first heuristic of ‘enter new countries through acquisitions,’ executives added a heuristic to ensure gaining such support in later entries: ‘ensure pre-acquisition integration of target executives.’ An executive team member described, ‘*Based on our experience (in Sweden), we’re talking a lot with them (company managers) before acquisition, trying to find out if they will back us up 100 percent. If they will, then we make the acquisition.*’ Executives then added detail to this second heuristic after entering their third and fourth countries (France and Germany). F-Supplysoft’s executives observed problems with their French acquisition that signaled the need to motivate acquired managers after the sale. This prompted executives to revise the ‘ensure pre-acquisition integration’ heuristic in their next entry (Germany) to include ‘high investment in post-acquisition integration.’ The VP overseeing Germany noted that F-Supplysoft executives ‘*spent a lot of time in Germany after we made our acquisitions to make sure that we continued to integrate them and explain our values to them and how they would address new markets.*’ This elaboration added emphasis on cultural and business integration post-acquisition to the heuristic.

Although these acquisition-related heuristics facilitated entry into F-Supplysoft’s first four countries, the executive team later realized that acquisitions as an entry mode could also be expensive and slow. But, rather than adding further heuristics about when (and when not) to use acquisitions or when (and when not) to use other entry modes, they cut heuristics. The executive team eliminated their procedural heuristics regarding entry mode (e.g., ‘enter new countries through acquisition’ and ‘ensure pre- and post-acquisition integration’) and did not replace them with more elaborated heuristics about using acquisitions or new procedural heuristics about when to use other entry modes. This pruning of heuristics enabled firm members to improvise the entry mode based on country-specific conditions at the time, not heuristics. For

Table 4. Simplification cycling



| Firm | Examples of simplification |
|--------------|---|
| F-Meddata | (1) Eliminated procedural heuristic of sending young Finn to open new countries because firm wanted more experienced leaders to perform task and oversee country operations. (2) Eliminated procedural heuristic of using standard criteria to qualify customers after developing new template in entry three. |
| F-Supplysoft | (1) Eliminated acquisition-related procedural heuristics since acquisition targets were too expensive and acquisitions delayed entry into large markets for growth. (2) Eliminated heuristic of staying Europe focused as it curbed opportunities into larger markets for growth (e.g., U.S.). |
| U-Analytics | (1) Eliminated selection heuristic of entering English-speaking markets as it prevented leaders from taking advantage of serendipitous opportunities in attractive emerging markets. (2) Eliminated procedural heuristic of having a strong liaison between HQ and country since it required too much time and resources. |
| U-Semi | (1) Eliminated temporal heuristic of moving from tier-three to tier-two to tier-one countries since this heuristic was no longer needed after the firm had entered tier-one countries. (2) Eliminated procedural heuristic of using a consultant to enter new countries after leaders had developed expertise. |
| S-Enterprise | (1) Eliminated procedural heuristic of using TMTs to enter new countries as this prevented the company from taking advantage of entry into smaller, but rapidly growing markets. (2) Eliminated temporal heuristic of entering the U.S. market before entering Japan since after entering Japan the firm had reference customers. |
| S-Security | (1) Eliminated selection heuristic of restricting internationalization to Asia since it precluded other high-value opportunities outside the region (e.g., Saudia Arabia). (2) Eliminated procedural heuristic of leveraging Singapore bank contacts to get deals in other countries since local customers wanted local references. |

example, the need to service big potential customers in the U.K. (fifth entry) led leaders to use a greenfield entry mode to establish a presence quickly. The executive in charge recalled, *'We decided to go in, establish an office, and get a presence. So we rented a small office in a serviced office with furniture, telephone lines, everything you need. I think that has saved time. It is the right way to do it in the U.K.'* Alternatively, the country-specific conditions in the U.S. (sixth entry) led leaders to choose an alliance entry mode. The CEO said, *'We had to make a decision how to establish operations in the U.S. We found very good acquisition targets, but prices were sky high and it was taking too much time. So we decided to go with partners.'*

Another illustration is U-Analytics, a U.S.-based enterprise software firm. The two founders created customer relationship management (CRM) software to help firms 'mine' their data. During the firm's first and second country entries (Australia, U.K.), the executive team relied on a few selection heuristics (e.g., 'restrict internationalization to English-speaking markets,' 'sell real-time analytics') and a few procedural heuristics (e.g., 'use implementation partners,' 'create a strong HQ liaison for each country'). During the third to fifth country entries, however, U-Analytics' executive team jettisoned some heuristics (Table 4). They dropped the selection heuristic of 'restrict internationalization to English-speaking markets.' This heuristic had been valuable because it exploited the British background of a founder and facilitated entry by focusing on linguistically and culturally similar countries like Australia and the U.K. But now, executives saw that it prevented them from addressing attractive opportunities in non-English-speaking markets like France, Germany, and Korea (entries three to five). Rather than substituting this selection heuristic with a priority heuristic (e.g., give preference to English-speaking markets) or elaborating the selection heuristic (e.g., enter English-speaking and/or large markets) to guide country selection, they simplified their portfolio by eliminating the heuristic. U-Analytics also eliminated its procedural heuristic 'create a strong HQ liaison for each country' because executives observed that being a liaison consumed too much time. As a HQ leader noted, *'My expectation was that (the country) would be more autonomous than it ended up being. It required a lot of attention. It wasn't really until we were going that I realized*

what a huge job I had to do in headquarters to keep the U.K. and Australia in the mind-set.' Although the executive team could have replaced their existing heuristic of creating a HQ liaison with an updated one or added more elaborate heuristics for directing the activities a liaison should do and avoid, they did not. Rather, they simplified their heuristic portfolio by eliminating heuristics.

Why do firms engage in simplification cycling? An obvious reason is that some heuristics become obsolete. But a subtler reason is that firms often replace initial, naive heuristics with strategic ones. For example, F-Supplysoft executives began with a selection heuristic that emphasized entering Scandinavian countries, beginning with Sweden, because these Finns were very familiar with Sweden. But they later substituted a more strategic heuristic around market size that was much more related to success. Firms also chunked granular heuristics into abstract ones. For example, S-Security changed a selection heuristic from 'sell to governments, insurance companies, and banks' to 'sell to organizations with extensive proprietary data and ability to pay.' This heuristic led the firm to target oil companies in Saudi Arabia, insurance firms in Malaysia, and manufacturing firms in China. Firms also substitute heuristics with greater precision, such as when S-Enterprise added their priority heuristic for the Rosetta Net standard.

Overall, replacing superficial heuristics with higher-quality ones (i.e., more strategic, abstract, and precise) again resembles the transition from novice to expert. Cognitive science research finds that experts in diverse domains like bridge, physics, baseball, and electronics use heuristics based on strategic aspects of their situation (e.g., threats and opportunities) (Feltovich *et al.*, 2006; Chi, Feltovich, and Glaser, 1981). For example, bridge experts pay attention to the number of cards in each suit, which is more closely related to winning than number of aces (which novices track). In contrast to novices, chess experts pay particular attention to the location of the king (Charness *et al.*, 2001), while venture experts rivet attention on customer problems (Baron and Ensley, 2006). Experts also use abstract heuristics that chunk information and generalize across situations (Charness, 1979). For example, physics experts rely on general laws like conservation of momentum to solve problems while novices attend to concrete problem features like whether the problem involves a spring or inclined plane

(Chi *et al.*, 1981). Finally, consistent with simplification cycling, experts are reflective about what and how they know and so frequently restructure and refine their representation of knowledge to access new and existing information more efficiently (Feltovich *et al.*, 2006).

But replacing and reorganizing heuristics does not explain why firms keep their heuristics portfolios small. Psychology research suggests an intriguing reason—i.e., a fundamental trade-off between adding new heuristics to efficiently fit every situation (Goldstein and Gigerenzer, 2009) versus using a few heuristics and flexibly engaging in real-time problem solving (Switzer and Sniezek, 1991). On the one hand, adding heuristics may ‘overfit’ heuristics to experiences, create confusion, and even offer conflicting guidance. On the other hand, deleting heuristics may underexploit past experience and create mistakes. Simplification cycling may help balance this tension. Strikingly, a similar trade-off occurs in the strategy literature where extensive structures like large heuristics portfolios conserve attention and reduce mistakes by providing efficient guidance, while minimal structures flexibly open up the range of action but also introduce errors (Davis *et al.*, 2009).

Finally, firms may keep their number of heuristics small to maintain neural plasticity, which is the degree to which cognitive systems can change (Anderson, 2000; Shepherd, 1991). Neural plasticity is highly dependent on long-term knowledge organization at the biophysical level (Hawkins, Kandel, and Siegelbaum, 1993; Koch, 1999). When that organization is streamlined into simple cognitive structures, adding new information is easy and searching existing information is quick (Cowan, 2001). So when the organization of process experience is streamlined into a few heuristics, it is easier to add or reorganize heuristics in long-term memory. This is particularly important because it enables firms to improvise action within a simple structure of rules that keeps behavior at least partially coherent (Eisenhardt, Furr, and Bingham, 2010; Miner, Bassoff, and Moorman, 2001). Overall, simplification cycling produces an increasingly able, yet small, set of heuristics that are better remembered among firm members. In sum, we propose:

Proposition 3: As experience increases, firms are likely to elaborate and then simplify their heuristics.

DISCUSSION

We add to organizational learning theory and strategy by clarifying that heuristics are central to strategy. Prior research indicates the strategic importance of organizational processes (Eisenhardt and Martin, 2000; Teece *et al.*, 1997) and finds that organizational processes improve with experience (Argote, 1999). But this work leaves unaddressed what is actually learned. Using a novel method that opens the ‘black box’ of learned content, we address this gap. We examine what six entrepreneurial firms from three countries explicitly learn as they internationalize.

Framework: learning heuristics from organizational process experience

A primary contribution is an emergent theoretical framework for what firms explicitly learn from their accumulated process experience. First, firms learn *portfolios of heuristics*. Executives approach unpredictable situations as problem solvers (Simon, 1973). They develop a few heuristics that fit available information (which is often spotty) and attention (which is often brief), but still provide workable solutions that are amenable to improvement. Since these heuristics are ‘easy to access and remember,’ they are readily communicated and understood by dispersed firm members. Thus, although much strategy research exploring organizational processes invokes the language of routines (Helfat *et al.*, 2007; Martin and Salomon, 2003), firms explicitly learn heuristics.

Second, learned heuristics have a *common structure* that relates to capturing opportunities. Firm members translate their process experience into specific types of heuristics (i.e., selection, procedural, temporal, and priority) that are consistent across firms. This structure of heuristics exists because of the underlying problem that organizational processes address—the effective capture of opportunities within a larger flow of heterogeneous possibilities. Hence, while firms create unique heuristics (e.g., be Asia focused, enter countries with original device manufacturers), these heuristics share a common structure because the same general problem is addressed. Therefore, in contrast with prior theoretical arguments that suggest the content of what is learned from experience may be idiosyncratic to a particular firm (Nelson and Winter, 1982), our framework argues that it is

idiosyncratic in details, *but* has a common structure across firms such that each heuristic type centers on a particular aspect of opportunity capture.

Third, firms learn these opportunity-capture heuristics in a specific *developmental order*. They begin with less cognitively sophisticated heuristics that address single opportunities (selection and procedural heuristics). They then add more cognitively sophisticated heuristics (priority and temporal heuristics) that relate to several opportunities at once. Thus, consistent with cognitive science research, we find that cognitive formation of heuristics follows a path of increasing difficulty (Carey, 1985; Inhelder and Piaget, 1958; Spelke, 1999). Learning about relationships among multiple actions requires greater expertise, while learning about time often begins later because individuals frequently develop temporal understanding by building on prior, nontemporal understanding (Anderson, 2000; Boltz *et al.*, 1998). Overall, this order resembles the development of expertise—experts develop through experience, becoming better able than novices to accommodate related actions and time frames (Ericsson *et al.*, 2000; North *et al.*, 2009).

Fourth, firms engage in *simplification cycling* in which they add and prune heuristics. Consistent with cognitive science research, simplification cycling enables firm members to maintain neural plasticity so they can readily add and remember heuristics (Anderson, 2000). It also ensures efficient encoding of heuristics in long-term memory for easy recall and better updating. By maintaining a small heuristic portfolio, executives can balance between gaining traction and efficiency through some consistent actions (e.g., always use partners) while maintaining flexibility to improvise in actual conditions (e.g., country-specific approaches to finding partners). Hence, firms avoid ‘overfitting’ their heuristics to accommodate the specifics of every opportunity. Further, our framework is consistent with cognitive research that finds experts frequently fine-tune their cognitive understanding (Feltovich *et al.*, 2006) and as expertise increases, guidelines become few, strategic, and abstract (Charness *et al.*, 2001; Chi *et al.*, 1981; Langer and Imber, 1979).

Overall, our framework identifies *what* firms explicitly learn as they gain organizational process experience. Firms: (1) begin by learning selection and procedural heuristics; (2) add temporal and priority heuristics; and (3) engage in simplification

cycling to hone increasingly strategic, yet small heuristic portfolios. This learned content reflects the active, pragmatic approach of mindful problem solvers who are facing spotty information, limited time and attention, and too many diverse opportunities.

Psychological foundations of strategy

Our study contributes to the psychological foundations of strategy by clarifying how heuristics are central to strategy. First, we highlight a positive view of *heuristics as ‘rational.’* Much psychology research frames heuristics as biased, poor substitutes for computations that are too challenging to perform (Piattelli-Palmarini, 1994; Thaler, 1991) and emphasizes errors, such as misuse of probability (Kahneman and Tversky, 1973; Tversky and Kahneman, 1974). The strategy literature has largely adopted this negative view (Busenitz and Barney, 1997; Holcomb *et al.*, 2009), invoking heuristics as the explanation for irrational behavior and strategic failure.

In contrast, we highlight a positive view. Building on psychological research (Gigerenzer, 2008; Gigerenzer and Brighton, 2009), our findings are consistent with the insight that heuristics may provide greater accuracy in strategic action, not just require less effort, than more information-intensive and analytically complex approaches. Strategists develop relevant heuristics that relate to solving key problems (e.g., how to enter new countries effectively) and exploit context-specific information they possess (e.g., understanding Asian markets). Often these heuristics effectively proxy for complex, correlated information and are related to superior outcomes. Much heuristics research misses these advantages because it puts individuals into artificial laboratory contexts, provides stylized problems that are not strategically relevant (e.g., binary choices with correct answers), and limits opportunities to learn. In other words, by eliminating realistic contexts, research often ‘stacks the deck’ against heuristics. Finally, strategists further enhance the strategic value of heuristics by keeping their number small, thereby facilitating their improvement and avoiding overgeneralization from past experiences.

By contrast, information-intensive and analytically complex approaches can be less accurate despite more effort. For example, analytically complex approaches often deal poorly with discrepant

information because it is difficult to determine the weighting of such information (Wilson and Schooler, 1991). Information-intensive approaches tend to ‘overfit’ solutions based on past experience and so can have weak predictive accuracy (Gigerenzer and Brighton, 2009). Additionally, relying on high-effort approaches can lead individuals to make choices they later regret because they focus too much attention on less relevant details (Wilson and Schooler, 1991). Overall, the counterintuitive insight is that heuristics may yield more effective strategic actions than information-intensive, analytically complex approaches *even when time, computational capability, and information are available*. The more fundamental implication is the existence of multiple kinds of strategic ‘rationality.’ Comprehensive logical analysis with extensive information may be the ‘rational’ approach for decisions when there is high homogeneity in experiences and many similar experiences. Heuristics, alternatively, may be the ‘rational’ approach for decisions when there is high heterogeneity in experiences (e.g., countries are very different), high unpredictability, and relatively few experiences (e.g., several country entries per year)—attributes of most strategic decisions.

Second, our study contributes to the psychological foundations of strategy by indicating the role of *expertise in capability creation*. Although there is debate about capabilities in the strategy literature, there is convergence that high-performing organizational processes are core features of capabilities (Eisenhardt and Martin, 2000; Helfat *et al.*, 2007). Bingham *et al.* (2007) add by empirically linking heuristics to high-performing organizational processes, thereby suggesting that heuristics are also central to capabilities. Yet, despite the importance of capabilities for competitive advantage, there is little research detailing how capabilities come to exist. For example, some literature equates capabilities with performance (Ethiraj, Kale, and Krishnan, 2005), focuses on antecedents of capabilities (Helfat and Lieberman, 2002), or examines the evolution of capabilities in broad strokes after creation (Helfat and Peteraf, 2003). So the question of capability creation is largely unanswered.

Our contribution is to clarify the role of expertise in capability creation. As noted earlier, firms learn simple heuristics, add more cognitively sophisticated ones, and then hone their heuristics in increasingly strategic, yet deliberately small, portfolios. This learning progression closely tracks the

cognitive development of expertise. Since heuristics are key elements of processes and, thus, capabilities, capability creation involves a transition from novice to expert heuristics. This further suggests that superior capabilities rest on better (not more) heuristics. More fundamentally, this implies that opportunity-capture heuristics for key organizational processes constitute at least some of a firm’s choices (i.e., strategy) for how to compete successfully in unpredictable markets.

Third, our research informs the psychological foundations of the *strategic logic of opportunity*. In contrast to position and leverage logics, firms using opportunity logic achieve competitive advantage by capturing opportunities sooner, faster, and more effectively than rivals (Bingham and Eisenhardt, 2008; Eisenhardt and Sull, 2001; Roberts, 1999; Zott, 2003). Bingham *et al.*, (2007) support the strategic value of opportunity logic by linking opportunity-capture heuristics to superior performance. Davis *et al.*, (2009) show that ‘simple rules’ opportunity logic is essential in unpredictable markets. Here, the optimal number of heuristics converges to a small range termed the ‘edge of chaos’ where there is an inverted-V relationship between the number of heuristics and performance. But, opportunity logic research is silent on the intriguing concept of the edge of chaos beyond noting that staying there requires a lot of attention (Brown and Eisenhardt, 1998).

Our insight is that simplification cycling is how firms stay at the edge of chaos. Simplification cycling enables executives to balance the trade-off between efficiency and flexibility by honing a small, yet high-quality, portfolio of heuristics to guide the flexible capture of opportunities. Since key organizational processes are created and maintained by dynamic capabilities (Danneels, 2008; Eisenhardt and Martin, 2000; Teece *et al.*, 1997), simplification cycling is likely to be a critical dynamic capability. It reshapes heuristics at the heart of high-performing organizational processes. This is a critical insight because there is almost no empirically grounded identification of dynamic capabilities (Di Stephano, Peteraf, and Verona, 2010).

Overall, we contribute to the psychological foundations of strategy by clarifying that heuristics are central to strategy: (1) heuristics are ‘rational,’ especially in unpredictable markets; (2) capability creation involves the transition of novice to expert

heuristics; and (3) simplification cycling of heuristics portfolios is a key dynamic capability, enabling firms to poise at the ‘edge of chaos.’

Bringing together learning and knowledge

We also contribute by bringing together the organizational learning and knowledge literatures that are closely related but rarely combined. On the one hand, the organizational learning literature repeatedly finds firms learn organizational processes as they accumulate experience, but typically infers what is learned. On the other hand, the organizational knowledge literature richly describes many types of knowledge that could be learned, but does not tie them to accumulated process experience.

Our contribution is to link these literatures by combining (1) learning’s emphasis on experience and (2) knowledge’s focus on content. We find that executives first begin to gain declarative knowledge (i.e., conscious theories about what geographic region to focus on, what customer types to target, etc.) and procedural knowledge (i.e., understandings about how to execute the mode of entry, the sales approach, etc.). As they accumulate experience, executives then gain knowledge about time and priorities. Although these knowledge types are often overlooked in the literature, temporal knowledge is useful for synchronizing the actions of various functional groups (Bingham, 2009), while priority knowledge is helpful for aligning the actions of firm members with the most critical activities. Thus, our findings contrast with those of Cohen and Bacdayan (1994) who study experience with the repetitive process of playing a simple card game in a laboratory setting. They find that individuals primarily learned action steps stored as procedural knowledge (i.e., automatic skills). Together, our two studies indicate that heterogeneous experience yields heuristics of varied knowledge types, whereas homogeneous experience yields routines remembered primarily as procedural knowledge.

Another contribution is to organizational memory. The knowledge literature often conceptualizes organizational memory as explicit knowledge that is codified into manuals and other written documents (Zollo and Singh, 2004). In contrast, we argue that, while organizational memory is often explicit, it does not require codified form. Rather, the diffusion of explicit knowledge through language enables experiential lessons to be widely

shared and understood by others, even if the knowledge is not codified. This suggests the benefits of codification are contingent. As experiences with an organizational process become more similar, such as allying with the same partners (Zollo *et al.*, 2002), acquiring in related industries (Haleblian and Finkelstein, 1999), and entering culturally similar countries (Johanson and Vahlne, 1977), codification becomes possible and efficiencies in executing standardized action steps emerge. But when experience is diverse, codification is less imperative. Thus, we offer a different view from those who suggest the benefits of codification increase as the similarity of experience decreases (Zollo and Winter, 2002).

CONCLUSION

Our primary contribution is clarifying that heuristics are central to strategy. But, like all research, ours has limitations, notably in measuring what is explicitly learned. We use a novel approach that reinforces cognitive data gained from several questioning perspectives with behavioral data and triangulates information from multiple informant types and sources. Our work is a first step in addressing the empirical challenge of opening the ‘black box’ of what is learned from process experience. It is also part of a broader program of research on learning from process experience that also addresses why some firms do not learn (Bingham and Davis, forthcoming; Bingham and Haleblian, forthcoming) and how heuristics influence performance (Bingham *et al.*, 2007; Bingham, 2009).

Based on exploration of rich field data, our emergent theoretical framework argues that firms learn portfolios of heuristics. These heuristics have a common structure but idiosyncratic content and are learned in a phased cognitive development from novice to expert. Our framework is especially relevant for organizational processes with heterogeneous opportunities, relatively few experiences, and high unpredictability—i.e., characteristics of strategy. Broadly, we add to the psychological foundations of strategy by noting that superior capabilities rest on better (not more) heuristics and that simplification cycling is likely to be a fundamental dynamic capability. In other words, continually refining the cognitive sophistication and strategic value of opportunity-capture heuristics

may be a key to the elusive concept of dynamic capabilities. Our most counterintuitive insight is that 'simple rules' heuristics may be a more 'rational' strategy than analytically complex and information-intensive approaches in unpredictable markets.

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