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ROUTINES AS A SOURCE OF CHANGE IN ORGANIZATIONAL SCHEMATA: THE ROLE OF TRIAL-AND-ERROR LEARNING

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Organizational routines are ubiquitous, yet their contribution to organizing has been underappreciated. Our longitudinal, inductive study traces the relationship between organizational routines and organizational schemata in a new research institution, Learning Lab Denmark. We show how trial-and-error learning can connect routines and schemata through a microfoundation of observable action. Our analysis (1) identifies two processes of trial-and-error learning and (2) strengthens theory about the coevolution of interpretive schemata and routines. By recognizing the complex relationship between routines and schemata and the role that trial-and-error learning processes play in this relationship, organizations can gain a previously overlooked tool for managing change.

On December 15, 2000, the managing director and research director of Learning Lab Denmark (LLD), a new research institution funded by the Danish government, met to discuss how to create an organization that would be different from the traditional public university (Barry & Rerup, 2006; Rerup & Lafkas, 2006). To that end, Wetware, a consulting company hired by the two senior managers, articulated LLD's "espoused interpretive schema" in the following way:

> Learning Lab Denmark should be conceived of as "entrepreneurial man" rather than "bureaucratic man," as a network as opposed to a hierarchy, as Kasparov as opposed to Kramnik, Miles Davis improvisation as opposed to J.S. Bach composing, as Smart Car as opposed to Audi, as TriBeCa, New York as opposed to La Défense, Paris in the real world and as www.maedastudio.com as opposed to www.useit.com in virtual space and finally, as friction as opposed to harmony (Wetware, 2001: 4–5).

Espousing an interpretive schema that differentiated LLD from "the establishment" was important to the two senior managers, who believed that it would help the organization meet the challenge of producing cutting-edge, action-oriented research.

Articulation of an espoused—or "initial" (Labianca, Gray, & Brass, 2000: 240) or "new (expected)" schema (Balogun & Johnson, 2004: 544)—to define reality and create a common base for action is not unusual. One way that managers respond to challenges is by espousing new or different organizational interpretive schemata (Bartunek, 1984; Gioia

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& Chittipeddi, 1991; Labianca et al., 2000), but how these espoused schemata are "enacted" remains understudied (Balogun & Johnson, 2004; Tsoukas & Chia, 2002; Weick & Quinn, 1999; Zilber, 2002). We attempt to close this gap by studying some of the actions that the two senior managers and other members of LLD took to implement or enact the espoused schema for LLD. In particular, we focus on organizational routines, which are important sources of action in organizations (Cohen et al., 1996; Cyert & March, 1963; Feldman & Pentland, 2003; Nelson & Winter, 1982), and on the processes of trial-and-error learning that participants engaged in as they tried to perform the routines and other actions that would enact this organizational schema. In the context of LLD, we trace the links that, through trial-and-error learning, organization members made between routines and schema enactment. Through this tracing, we add to understanding of the relationship between the enactment of routines and the enactment of an organizational schema. We also add to understanding of trial-and-error learning.

Organizational routines, such as budgeting and recruiting, are "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman & Pentland, 2003: 95) that constitute organizational skills (Cohen & Bacdayan, 1994; Nelson & Winter, 1982). They are fundamental for accomplishing work in organizations (Cohen et al., 1996; Cyert & March, 1963; Zbaracki & Bergen, 2010). Scholars have noted the connection between routines and schemata but have focused primarily on how the latter influence routines (Balogun & Johnson, 2005; Feldman, 2003; Howard-Grenville, 2005; Tucker & Edmondson, 2003). For example, in the context of health care, Tucker and Edmondson (2003) noted that features of a schema, such as concern with a patient's immediate needs, can make it difficult to make enduring repairs to routines for patient care. Our study extends this research by showing how routines and schemata are interactively "coconstituted" through the actions people take to solve problems in routines and resolve questions about schemata. In doing this, we not only show that schemata can influence routines—but also that routines can influence schemata.

In 2001 LLD began with an espoused schema that highlighted the differences between the way the new institution would operate and the way traditional public university bureaucracies operated. Over time, as organization members developed actions that enabled them to accomplish necessary tasks, the enacted schema came to differ from the one that Wetware and LLD's founders initially espoused. Many of the actions that were developed were part of organizational routines, and we use the recruiting routine to illustrate the role routines can play in schemata change. Longitudinal data allowed us to investigate inductively how trial-and-error learning in LLD's recruiting routine challenged its espoused interpretive schema and how its members responded to this challenge. We document two kinds of trial-and-error learning processes that occurred over this time. One process was primarily for solving problems raised by the enactment of the routine, and the other was primarily for resolving questions raised by the disjuncture between espoused and enacted schemata. Our study thus provides a rare view of how trial-and-error learning links the enactment of routines with the enactment of schemata.

THEORETICAL BACKGROUND

We propose that to study the relationship between organizational schemata and routines more fully, it is useful to trace the trial-and-error learning that occurs as they change. To do so is to focus on the microfoundation of observable action that grounds enactment of routines and schemata. To clarify these key concepts in our analysis, we first discuss the concepts of espoused and enacted schemata. We then turn to routines and propose the importance of conceptualizing them as generative systems constituted of parts rather than as entities.

Espoused and Enacted Organizational Schemata

We define an *organizational interpretive schema* as a set of shared assumptions (Balogun & Johnson, 2004), values (Gioia, Thomas, Clark, & Chittipeddi, 1994), and frames of reference (Bartunek, 1984) that give meaning to everyday activities and guide how organization members think and act (Elsbach, Barr, & Hargadon, 2005). Schemata are knowledge structures that organize past and future experiences. "As such, schemata act as data reduction devices enabling individuals to negotiate a complex and confusing world" (Balogun & Johnson, 2004: 525). Although schema theory was developed at the individual level of analysis, scholars have argued that members of organizations can share schemata (Bartunek, 1984).

Managers articulate a new or different *espoused interpretive schema* to address problems or challenges. A new espoused schema is fairly similar to what Isabella referred to as an "in-progress frame of reference" (1990: 17). Labianca et al. similarly described an "initial schema," as "an assembly of tenuously connected [ideas] that a person draws on

in novel situations when behavior is unscripted" (2000: 238). The founders of LLD also believed that the espoused interpretive schema for the new venture should articulate its raison d'être.

An *enacted schema* is constituted of observable actions that transform intention into a pattern of realized cognition and action. Following Weick (2001), by "enacting" an event or structure, we mean bringing it into existence and setting it in motion. An enacted schema can be more or less consistent with the intended direction of an espoused interpretive schema (Mintzberg, 1978; Mintzberg & Waters, 1985; Zbaracki, 1998). When managers espouse a new interpretive schema, it is a cognitive idea. In this article, we use the notion of an enacted schema to build on past research (Balogun & Johnson, 2004; Labianca et al., 2000) and highlight the combination of cognition *and* action in creating enacted schemata.

Two streams of research have explored the relationship between espoused and enacted schemata. In one stream, scholars study "sensegiving," the "process of attempting to influence the sensemaking and meaning construction of others toward a preferred redefinition of organizational reality" (Gioia & Chittipeddi, 1991: 442), focusing on how managers seek to provide members with a common base for action (Gioia & Thomas, 1996; Maitlis & Lawrence, 2007). In the other stream, scholars study the actions (e.g., formal and informal meetings) middle managers and others take to enact and sometimes revise a schema espoused by top management (Balogun & Johnson, 2004; Bartunek, 1984; Johnson, 1988; Labianca et al., 2000; Zilber, 2002). Both streams offer important insights about how schemata are adapted through enactment (Maitlis & Sonenshein, 2010), and scholars have long recognized how action can both be determined by and lead to the revision of interpretive schemata. Yet scholars have also argued that more needs to be learned about how these changes occur (Weick & Quinn, 1999). Though prior work suggests that routines and schemata are to some extent coconstituted (Balogun & Johnson, 2005), we do not know how this coconstitution occurs. Our focus on the actions taken in organizational routines and on trial-and-error learning enables us to provide stronger, more detailed theory about how routines and organizational schemata are coconstituted and thus to enhance understanding of the role of action in schema change.

Routines as Linked to Schemata

We regard organizational routines as "generative" systems that are constituted through the interaction of "performative" and "ostensive" parts (Feldman & Pentland, 2003; Pentland & Feldman, 2005; Zbaracki & Bergen, 2010). As *generative* systems, routines are patterns for accomplishing work that achieve stability and change through endogenous interactions between the performative and ostensive parts that constitute them. Generative systems may also be affected by exogenous shocks, though they are defined by their internal dynamics (MacIntyre, 2007: 187). *Performative* actions are specific actions performed by specific individuals at specific times, and as they are performed over time, these actions make *ostensive* patterns. The source of the term "ostensive" is the notion of "ostensive definitions" (Latour, 1986; Sevon, 1996; Wittgenstein, 1958), in which the ostensive is constituted of specific instantiations that participants and/or observers experience as belonging together. In the case of a routine, the instantiations are the specific actions taken by the people enacting it. By expanding on previous research exploring the relationship between organizational routines and trial-and-error learning (e.g., Miner, Bassoff, & Moorman, 2001) and seeing routines as generative systems constituted of parts, we can understand more about the role trial-and-error learning plays in the enactment of organizational schemata.

Routines have often been portrayed as unitary (Salvato & Rerup, 2011). "Routine as entity" theories (Hodgson & Knudsen, 2004; Nelson & Winter, 1982) cast a routine as a nonobservable yet coherent entity with clear boundaries; a gene is an example of such an entity. From this perspective, trial-and-error learning occurs when an organization carries out regular activities, compares outcomes with targets, and then revises its routines as needed (Cyert & March, 1963; March, 1991). When an organization finds that it has not met its aspiration levels, it classifies this event as a problem, and it usually selects a routine to solve it. If the routine does not solve the problem, the organization replaces or revises the old routine by selecting and trying out a new routine from a sample that exists in its environment (Gong, Baker, & Miner, 2005). The organization continues this process until it finds a routine that yields a solution successful enough to replace the old routine (Baum & Ingram, 1998; Miner et al., 2001).

Entity theories of routines provide few details on such replacement (Levitt & March, 1988: 320). In particular, they offer little insight into how routines are tried out, thus creating an "important challenge for micro research" (Greve, 2008: 199). At the individual level, negative performance feedback or errors "cause the actor to do 'something' [but the literature] does not directly investigate how habits

and routines are changed" (Greve, 2008: 192). At the team level, research has overemphasized senior management's heroic role in the learning process and overlooked how team members manage its mundane aspects (Edmondson, Bohmer, & Pisano, 2001). At the organizational level, research has shown that it is difficult to replicate routines and practices (Jensen & Szulanski, 2007).

Moreover, scholars espousing entity theories of routines have not explored the heterogeneity of trial-and-error learning because they have assumed that the process pertains only to the relationship between routine and aspiration level (Greve, 2003). Consequently, they have paid little attention to how apparently disconnected individual actions aggregate into organization-level outcomes and processes (Salvato, 2009; Salvato & Rerup, 2011). For example, although entity theories link to higher-level capabilities (Gavetti, Levinthal, & Ocasio, 2007; Miner et al., 2001), they do not address how actions taken to accomplish routines can be a source of change in organizational schemata.

Thinking about routines as generative systems constituted of performative and ostensive parts (Feldman & Pentland, 2003; Pentland & Feldman, 2005) helps overcome these limitations. This perspective allows exploration of the internal dynamics of routines and better understanding of how they respond to external pressures. Per "structuration" theory and other theories of practice (Bourdieu, 1990; Giddens, 1984; Ortner, 1989), the performative and ostensive parts of routines have a recursive relationship whereby the performative aspects create and recreate the ostensive aspects, which in turn constrain and enable the performative aspects. The meaning of the ostensive patterns that emerge depends on the point of view of those experiencing the actions. What it means to "do recruiting," for instance, varies across persons and organizations and over time. As a result, a routine's ostensive aspects are multiple, and no routine is a single entity (Pentland & Feldman, 2005: 797).

We combine this conceptualization of routines with the conceptualization of organizational schemata discussed earlier to suggest that a "realm of action" (Barley, 1986) generates a microfoundation of observable action that connects the ostensive aspects of routines with enacted organizational schemata. To explicate the difference between ostensive patterns and enacted schemata, we first note two similarities: (1) they are both abstract patterns, and (2) both are constituted through action. Further, the two constructs overlap. The main difference between the two constructs is that (1) the ostensive patterns of a routine are constituted through task-specific actions that relate to a specific routine or subroutine, but (2) the enacted patterns of an organizational schema are constituted through the many types of actions that take place in organizations, including those that make up the extensive patterns of the routine. As a result, the patterns differ and operate at different levels of analysis. Ostensive patterns are constituted of actions related to accomplishing a specific task (e.g., recruiting) and operate at the level of routines. Schemata patterns are constituted of all the actions (some of which are part of routines and some of which are not) that an organization's members relate to its schemata, and they operate at the organizational level.

Our research questions, then, were: (1) How do heterogeneous processes of trial-and-error learning relate actions to the ostensive aspect of a routine and to an enacted organizational schema? (2) What similarities and differences are there between trial-and-error learning that creates a task-specific routine (such as recruiting) and trial-and-error learning that creates an organization's enacted schema?

METHODS

The purpose of this study was to build theory by conducting a longitudinal, inductive study of Learning Lab Denmark's (LLD's) developmental path (Pettigrew, 1990; Pratt, 2009; Suddaby, 2006). Because LLD was a "greenfield" organization, the heterogeneity of the process that connected its recruiting routine with its espoused interpretive schema was "transparently observable" (Eisenhardt, 1989: 537), which made this setting ideal for building theory about how trial-and-error learning connects routine and schema through a microfoundation of observable action.

Research Context

Learning Lab Denmark was a "hip" new research venture sponsored by the Danish government. It grew from 12 members in 2001 to around 80 in 2004. LLD's overall target was not only to produce cutting-edge academic research in the areas of learning, knowledge creation, and competence development, but also to communicate its findings broadly to the public (Mehlsen, 2004). The government wanted LLD to engage private and public organizations directly in projects related to workplace learning, world-class math and science, learning-oriented computer games, play and learning, and art and business. Another aspect of LLD's mandate was entrepreneurial initiation of risky projects that no other institution would take on via experimental, cross-discipline, international work.

In terms of output, LLD was expected to develop new theory on learning, create practical tools such as computer games, and disseminate academic findings in newspapers and practice-oriented outlets (see Barry and Rerup [2006] and Rerup and Lafkas [2006] for further details on LLD's work and mandate).

LLD operated as an independent organization under the Danish University of Education (DPU) until January 1, 2005, when it became a department of DPU. Its espoused organizational interpretive schema cast it as a "new kind" of research organization. At an LLD-organized conference on December 6, 2001, Jens Peter Jacobsen, the director of the Ministry of Science, Technology and Innovation, stated this vision:

> It is of utmost importance that the Lab continues to explore the knowledge landscape in an untraditional and unconventional way. Being "different" is the Lab's raison d'être. Doing things differently should be the Lab's core competence. In the way people work together, the way the projects are constructed and carried out, the way the organization is built up, and the way the workplace is physically constructed. In short, the Lab's activities should be characterized by nothing less than creativity, originality, risk-taking, transdiciplinary, and cross-border partnership.

Recruiting was central to LLD. To create an organization that met the espoused goals Jacobsen stated, LLD's founders did not want to hire traditional researchers from established academic research environments. Instead, they wanted people with alternative backgrounds who had worked in the private sector. They were willing to pay researchers up to 40 percent more than Denmark's public university system. After they had hired the initial core staff, however, various problems made it difficult to recruit additional employees. These problems generated numerous experimental trials, which in turn changed the recruiting routine and the espoused schema. In short, problems enacting its recruiting routine influenced the enactment of LLD's espoused schema.

LLD's board of directors, which was appointed by the Danish government in early 2000, hired the lab's senior management team in late 2000. This team consisted of a managing director and a research director. The two directors created a central office, the Secretariat, to supply administrative support, such as recruiting, budgeting, and grant administration, for LLD's research activities. These activities were initially organized into four sections, labeled "Consortia," and later into six, each of which had researchers and support staff who focused on a field of theoretical interest (Barry & Rerup, 2006). In the Consortia, many employees were hired on temporary contracts (e.g., 3–12 months), which made the recruiting routine more salient because "lots of people are constantly arriving and leaving. It is like a train station" (Secretariat employee, January 4, 2002).

In 2001, the Secretariat consisted of the two senior managers, a chief financial officer (CFO) and his assistant, a receptionist, and one "broker" (the "cultural manager"). Because part of LLD's mandate was to experiment with structuring the research process in alternative ways, it created several innovative positions, such as "broker," a job title that encompassed responsibility for managing a particular domain and building networks for exchanging ideas and knowledge both within LLD and between the organization and external stakeholders. As LLD expanded, the Secretariat also came to include several additional broker positions: an information technology (IT) broker and team (three people), a communication broker and media team (four to six people), a culture team (four or five people), a contract coordinator, and a translator. From 2001 to 2005, the recruiting routine was repeated 141 times.

This entrepreneurial environment offers a useful context for generating insights about the role that trial-and-error learning plays in routines and interpretive schemata. Greenfield organizations need to create both routines and schemata, and adaptation is important. Recruitment is a particularly interesting routine to investigate because of its relevance to an organization's interpretive schema (Chatman, 1991; Gerhart & Rynes, 2003). Firms that cannot hire "the right people" (Pfeffer, 2005), for instance, might experiment with new recruiting routines or espouse a particular schema to attract talent. Cha and Edmondson (2006: 60) found that the unconventional nature of a new venture's interpretive schema was instrumental in recruiting talented employees who felt dissatisfied at traditional advertising agencies.

Data Collection

The first author collected all the data, starting in 1999. The main fieldwork lasted from November 2001 to June 2004 and was supplemented by additional site visits in June 2005 and January 2008. This prolonged engagement in the field (Miles & Huberman, 1994; Suddaby, 2006) and the use of three primary data collection mechanisms (semistructured interviews, archival data, and observation of meetings) helped create a rich understanding of how LLD's schema and recruiting routine coevolved through trial-and-error learning. De-

tailed field notes (Emerson, Fretz, & Shaw, 1995) were taken as time and context permitted.

LLD began as an "organization-in-creation" (Aldrich, 1999). In a new venture, the initial espoused organizational interpretive schema and the imagined enactment of routines often overlap significantly, because the latter are based on the former. As specific performances of routines start to constitute the ostensive aspects of these routines, they may become different from what was imagined. Similarly, organization members' actions—many of which are performances of the routines—come to constitute the enacted schema, which may differ from the espoused schema. The first author was able to talk to all employees in the Secretariat and the various Consortia during his first visits to LLD's site. As the number of employees expanded, he interviewed people at various levels in the organizational hierarchy and from different functional areas and Consortia to create a more complete picture of how the emerging theoretical constructs interrelated (Strauss & Corbin, 1990). Interviews lasted from 30 minutes to four hours. This work enabled him to see how actions, problems accomplishing the imagined recruiting routine, and questions about the fit between those actions and the espoused interpretive schema generated change. Multiple informants reduce potential informant bias not only by letting a researcher triangulate data (Miller, Cardinal, & Glick, 1997), but also by adding complementary perspectives to the analysis. Whenever possible, independent confirmation of important statements was sought through alternative data sources (i.e., archival data or follow-up interviews).

In the initial interview protocol, questions were asked to surface, among other things, (1) LLD's espoused schema (e.g., "What is LLD's interpretive schema and how does it influence the way the organization operates?"), (2) how LLD recruited people (e.g., "What actions do people take in the process of recruiting employees and what actions do employees take in coming to work at LLD?"), and (3) what interviewees considered to be working or not working (e.g., "What is going well/not so well? Why?"). Following the constant comparative method (Strauss & Corbin, 1990), over time the first author adjusted the interview protocol to refine the theoretical perspective. Specifically, questions in 2001 were focused on identifying LLD's initial schema, whereas in 2002 and 2003, questions focused on how growing coordination problems (Okhuysen & Bechky, 2009) between LLD and DPU and between the Secretariat and the Consortia influenced the enactment of routines and the schema. During these interviews, employees talked openly about the problems they experienced in accomplishing imagined routines and the questions generated about schema enactment.

In January 2008, the first author revisited LLD to collect more data and to conduct "member checks" with key informants to ensure that the emerging theoretical framework "was sensible to, and affirmed by, those living the phenomenon of interest" (Nag, Corley, & Gioia, 2007: 829). Specifically, he presented the respondents with statements and examples from their prior interviews to clarify the validity of critical events and our emerging constructs.

Semistructured interviews. As summarized in Table 1, a total of 109 semistructured interviews with a cross section of 44 different informants were conducted and transcribed. These included 91 one-on-one interviews with 33 individuals, 14 group interviews with 25 individuals, and 4 telephone interviews with 3 individuals.

Archival data. Four hundred forty-six documents representing 3,802 pages of data were collected to track trial-and-error learning related to LLD's task-specific routines and interpretive schema. In another study of this enterprise, Larsen and Aagaard (2003) interviewed numerous people who were central to LLD's formation, such as Denmark's minister of education. Their raw data helped the current authors to better understand LLD's espoused schema. We created categories for filing, retrieving, and analyzing the archival data, separating founding and later documents. The founding documents described the values and assumptions implicit in the espoused schema and contained clear statements about the kinds of people LLD should hire. Later documents described the schema differently. For instance, documents in 2001 emphasized that LLD was a private organization working closely with private businesses, whereas in 2004, LLD's website stated that LLD was working mostly with public organizations.

Observation of meetings. The first author observed 50 hours of meetings, 15 of which were recorded and transcribed verbatim. Three meetings were especially noteworthy. First, a three-hour meeting (June 12, 2002), at which all employees were present to discuss the need to standardize and professionalize LLD's work flow, helped clarify changes in the ostensive aspect of the institution's recruiting routine. Second, a two-hour broker meeting (September 11, 2002), during which four managers in different areas of the Secretariat discussed the difficulty of working with the Consortia, revealed how different groups were satisfied or dis-

TABLE 1
Quantitative Details of Interview Data, 2001–08[a]

Informant[b]	2001	2002	2003	2004	2005	2008	Total
Chief advisor, Ministry of Education		1					1
Member of White Paper Working Group 1		1					1
Member of White Paper Working Group 2		1					1
Board member 1		1					1
Managing director (MD)	1	3 + 1*	1 + 2^ + 1*				5 + 2 + 2^
Research director (RD)		1 + 1*	1*		1*	1	2 + 3*
Advisor to MD and RD			1				1
CFO 1	1	1					1
CFO 2		1					1
CFO 3			1*				1*
Manager/broker 1	1	3	1				6
Manager/broker 2			1*	1	1		1 + 1*
Manager/broker 3						1	1
Manager/broker 4		3	1*				3 + 1*
Manager/broker 5		6	2 + 2*				8 + 2*
Manager/broker 6		4	3 + 1*	1			7 + 1*
Consortium director 1	1	5	1*	1	1*	1	8 + 2*
Consortium director 2	1	1 + 1*					2 + 1*
Consortium director 3	1	3 + 1*	1				5 + 1*
Consortium director 4	1	3 + 1*	2		1*		6 + 2*
Consortium director 5			1^ + 1*				1^ + 1*
Consortium director 6		2	1				3
Consortium employee 1 (5)		1*	1*				2*
Consortium employee 2 (4)		1*	1*				2*
Consortium employee 3 (2)		1*					1*
Consortium employee 4 (3)		1*	1*				2*
Consortium employee 5 (3)		1*					1*
Consortium employee 6 (3)			1*				1*
Consortium employee 7 (6)			1*				1*
Consortium employee 8 (2)			1*				1*
Consortium employee 9 (1)			1				1
Consortium employee 10 (2)			2				2
Consortium employee 11 (4)			1				2
Secretariat employee 1		1*		1			1 + 1*
Secretariat employee 2		1*					1*
Secretariat employee 3		2					2
Secretariat employee 4		4				1	5
Secretariat employee 5			1				1
Secretariat employee 6			1 + 1^				1 + 1^
Secretariat employee 7	1						1
Secretariat employee 8	1	3	1*				4 + 1^
Secretariat employee 9			1			1	2
Secretariat employee 10	1						1
Secretariat employee 11	1	1					2
Secretariat employee 12			1*				1*
Secretariat employee 13			1*			1	1 + 1*
Total (n = 44)	11	50 + 5*	19 + 8* + 4^	4	1*	7	109

[a] Each number indicates participation in an interview. Unnotated numbers represent individual, face-to-face interviews. The superscript "^" indicates a telephonic interview. A "*" indicates a group interview. A total of 14 group interviews were conducted.
[b] A number in parentheses indicates the Consortium at which an employee worked.

satisfied with the espoused schema. Third, a seven-hour meeting (March 31, 2003), which brought the two senior managers and all the brokers and Consortia directors together to discuss a new vision statement, illuminated how LLD's interpretive schema was changing.

Data Analysis and Coding

Both authors analyzed the data. Our focus on the espoused schema and the recruitment routine emerged through an iterative process. From analyses of the extensive field data and existing research on organizational schemata, organizational rou-

tines, and trial-and-error learning, we identified several interrelated core concepts that described the trial-and-error learning that unfolded during LLD's development (Saldaña, 2009). As in prior longitudinal studies of organizational change (Balogun & Johnson, 2004; Barley, 1986; Feldman, 2000; Siggelkow, 2002), our inductive effort went hand-in-hand with our data coding in a manner that let us identify the core concepts at various points in LLD's history (Langley, 2007).

In qualitative research, "no analysis strategy will produce theory without an uncodifiable creative leap, however small" (Langley, 1999: 691). We used two techniques to ground this leap in the data. First, the second author became a devil's advocate (Nemeth, Brown, & Rogers, 2001) who asked critical questions and introduced alternative explanations of the data to improve the quality of the theorizing. As an outsider to the site, she identified patterns in the data that the first author (e.g., the insider) either supported or refuted by using his rich understanding of the data (Bartunek, Foster-Fishman, & Keys, 1996; Gioia et al., 1994: 368). From this exploration of the data emerged a recursive relationship between the actions people were taking in the organization and the ostensive aspects of the recruiting routine, on the one hand, and the organizational interpretive schema, on the other.

Second, we used techniques such as constant comparison (Glaser & Strauss, 1967; Suddaby, 2006) and content analysis (Krippendorff, 2004), not only to enhance our interpretation of the data, but also to increase our confidence in the analytical process (Golden-Biddle & Locke, 2007). In our content analysis, we used the "find" tool in Microsoft Word to annotate sections in the transcribed interviews and documents. We then iteratively pulled out and aggregated sections to arrive at our final codes.

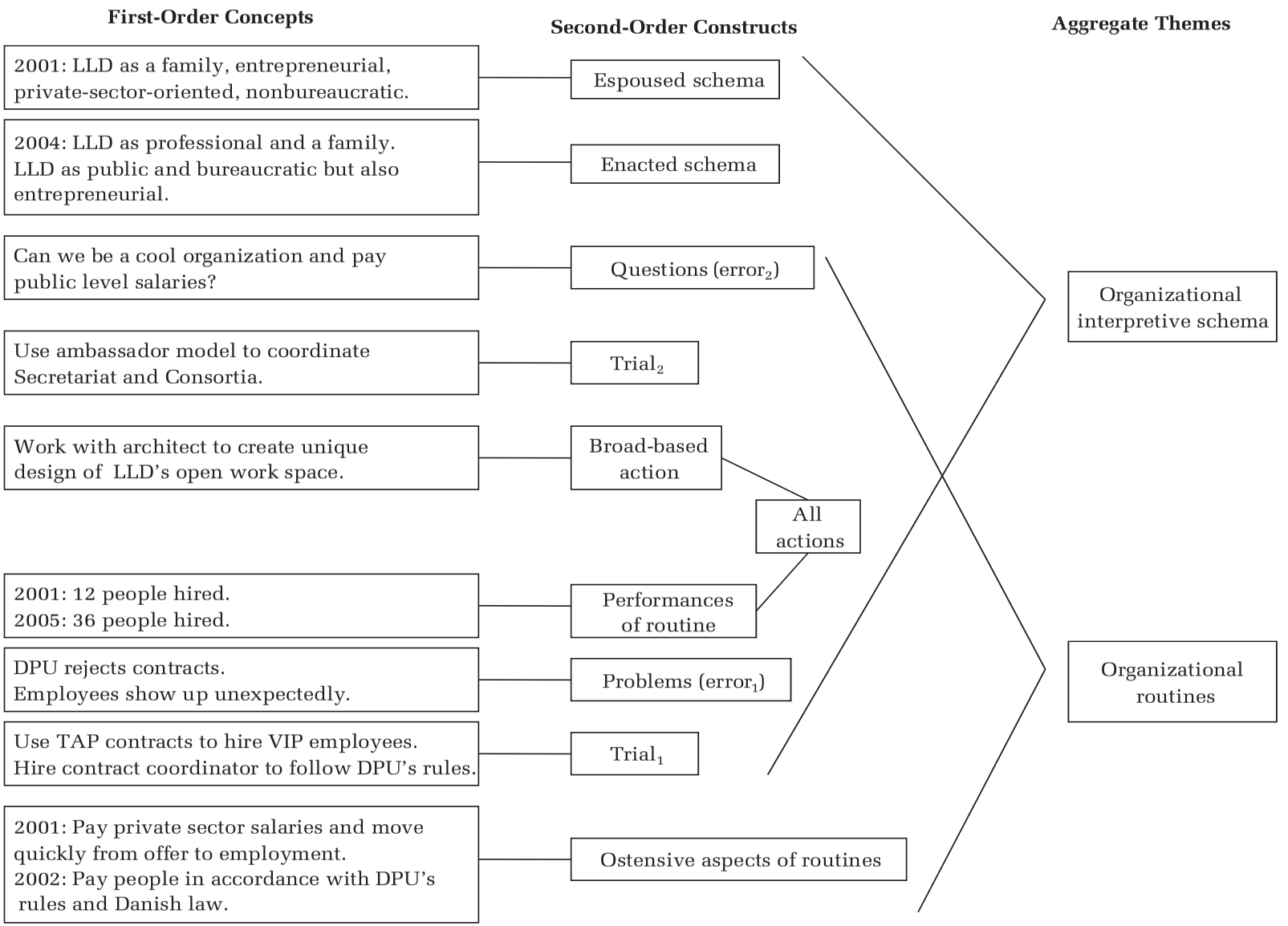
We initially noticed several strong statements about the organization's interpretive schema and many controversies surrounding the recruiting routine. Because LLD was an emergent organization, the recruiting routine was particularly prominent. We also analyzed other routines that were salient in the interviews and observations, including those for (1) mailing, (2) producing *LLD Quarterly*, a magazine that featured the lab's research, (3) conference organizing, (4) reimbursement, and (5) hotel booking. We analyzed how these routines changed over time and how they supported or challenged the lab's espoused interpretive schema. We focus here primarily on the recruiting routine because of its centrality to the emergent organization and because it is relatively easy for people unfamiliar with the LLD context to understand.

Our analysis also indicated that some broad-based organizational actions were not routines. In this regard, we specifically identified: (1) the development of a communication strategy to make LLD more visible in the Danish media and (2) interactions between the two senior managers and the architect hired to create a unique open work space for LLD. These actions were not part of day-to-day operational tasks and were not repetitive in the same manner as the others routines we observed. Our analysis revealed that both actions taken as part of routines and these other broad-based forms of action contributed to enacting the espoused schema. We focus on routines because they are a common organizational phenomenon, but their influence on schemata has not been explored.

These analytical strategies helped us develop a data structure consisting of first-order concepts, second-order constructs, and aggregate themes (Corley & Gioia, 2004), which we identified by focusing on three questions: (1) How did members of LLD enact the recruitment routine over the period of observation? (2) What organizational interpretive schema did these members espouse and enact in LLD's practices? (3) How did the routine and schema change?

We identified emergent concepts in our data and categorized them by juxtaposition with those in the relevant literature (Suddaby, 2006: 634). We first identified the relationships between the organizational interpretive schema and the recruiting routine. Then, as explained above, we used these relationships iteratively to code the data in more detail to identify the role of action in trial-and-error learning in LLD's recruiting routine and interpretive schema. Through an iterative process that included responding to feedback from six reviewers, we identified several second-order constructs (Corley & Gioia, 2004; Feldman, 1995). Figure 1 depicts the final data structure and provides examples of the raw data or first-order constructs that informed "the theoretical labels or constructs [we used] to represent the data" (Pratt, 2009: 860). The first-order concepts on the left side of Figure 1 are "concepts-in-use" (Gephart, 2004: 455) and represent language used by our informants. We developed the second-order constructs, shown in the middle of Figure 1, by identifying categories among the first-order concepts, which allowed us to "lift [the] data to a conceptual level" (Suddaby, 2006: 636). In keeping with our inductive process, the second-order constructs emerged from our analysis. Labels already in use in the scholarly literature (including "enacted and espoused schema," "ostensive aspects," and "performances of routines") captured some of our second-order constructs

FIGURE 1
Data Structure



well, and others required new labels, such as "$trials_1$," "$trials_2$," "problems ($errors_1$)" and "questions ($errors_2$)." Overlap between the second-order constructs and the aggregate themes, indicated by the two large brackets toward the right-hand side of the figure, shows that some of the second-order codes constitute both routines and the interpretive schema (e.g., $trial_2$), which suggest that they play a role in linking the two aggregate themes.

We used the second-order constructs and aggregate themes presented in Figure 1 to shape our account and track over time how LLD's espoused schema changed into its enacted schema. We define the 12 second-order constructs and aggregate themes in the following way: (1) An *organizational interpretive schema* is the values and assumptions that provide organization members with a common base of action and thinking (Balogun & Johnson, 2004). It is expressed over time as both espoused and enacted schemata. (2) An *espoused schema* is a preferred (re)definition of organizational reality that managers and/or other actors hope to enact (Gioia & Chittepeddi, 1991). (3) An *enacted schema* is the *organization-specific* patterns created and recreated through actions taken to realize the espoused schema. The espoused schema is what managers and other members claim their organization is or should be about, but the enacted schema depends on the actual actions people in and around the organization take. The espoused schema and the enacted schema may not be the same.

(4) *Routines* are constituted of performative and ostensive aspects and defined as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman & Pentland, 2003: 95). (5) *Ostensive aspects of a routine* are *task-specific* patterns created and recreated through actions (Pentland & Feldman, 2005). In our case, the task was recruitment. (6) *Performances of a routine* are specific actions (performative aspects) taken by organization members to enact a task (Feldman & Pentland, 2003).

(7) *Broad-based actions* are actions that are not part of task-specific routines. Both performances that accomplish task-specific routines and broad-based actions contribute to enacting an organization's interpretive schema. (8) *All action* is the combined action categories of performances of the recruiting routine, performances of other task-specific routines, and broad-based actions.

In the following, we define two "types" of trial and error. We use a subscript to signify each type. (9) *Problems ($errors_1$)* are instances in which performances fail to accomplish a task-specific routine, or fail to do so in a way that is acceptable to organization members. (10) *Questions ($errors_2$)* are concerns about whether performances are consistent or inconsistent with the organizational interpretive schema, whether espoused or enacted. (11) *$Trials_1$* are experimental actions that respond to problems ($errors_1$). (12) *$Trials_2$* are experimental actions that respond to questions ($errors_2$). These experimental actions are different from $trials_1$ in that they may affect the many routines as well as the nonroutine actions that affect how an organizational schema is enacted.

We identified these core concepts in the data as we analyzed the observed actions of organization members recorded in field notes and the statements made in interviews and contained in other documents. Although the core concepts are analytically distinct, empirically actions contribute to multiple structures (Sewell, 1992). In our case, the structures of interest, organizational routines and organizational schemata, were enacted through many of the same actions. The reader may want to know, then, how we distinguish between these in our data. In the following two paragraphs, we discuss how we identified statements as being related to either routines or schemata and the errors and trials associated with each of these concepts.

Defining organizational routines as task-specific was important to our ability to determine when participants' concerns were related to the recruitment routine and when they were related to an organizational schema (either espoused or enacted). In keeping with the emphasis in the qualitative methods literature on the importance of observing actions (Beal & Weiss, 2003; Eisenhardt, 1989: 537), the first author directly observed many actions LLD members took to advertise job openings, negotiate contracts, welcome new employees, and so forth. The interviews, direct observations, and archival data also provided many direct statements about actions. In keeping with our definitions, we did not consider actions that were only occasionally enacted to be part of the ostensive pattern of the recruitment routine. Actions that were parts of the ostensive pattern were identified either in summarizing statements, such as "On one of your first days at LLD, we will give you a guided tour of the buildings and introduce you to your new colleagues" (LLD *Staff Handbook*, 2007) or in statements indicating a deviation from a pattern: "The hiring procedures are not being followed because there are many people that have an individualistic approach to their work" (e-mail, Secretariat employee 9, Oc-

tober 3, 2003).[1] We identified problems ($errors_1$) associated with accomplishing the recruiting routine by tracking where the routine was mentioned in the data and noting the comments made about obstacles to moving from one step of the routine to the next. One set of problems occurred, for example, when DPU rejected contracts that LLD had written, making it difficult for LLD to have new recruits begin work: "Usually, when we hire we have problems in the interface with DPU. That's why they return the contracts" (field notes, comments made by Secretariat employee 1, general development meeting, June 2002). $Trials_1$ were identified by isolating specific actions that responded to problems ($errors_1$), such as the efforts to get contracts approved: "I am working on developing a manual so we will hire and introduce new employees in a more professional way" (field notes, comment made by manager/broker 1, Monday morning meeting, January 25, 2002).

We have conceptualized a schema (espoused or enacted) as being at the level of an organization as a whole. When people enact specific tasks, they are also enacting an organizational schema. Again, we relied on statements. Those that connected actions to the nature of the organization indicated to us that the relevant concern was the organizational schema. For instance, "The changing way of thinking [about following DPU's rules] expresses that we are a young organization that is trying to find our own legs to stand on and therefore has a constant need to reformulate who we are. . . . Because we are still figuring out the waters we are sailing, there has been a change in the perception of what it is that we do as an organization and how we do it" (interview, Consortium director 1, April 16, 2003). We identified questions ($errors_2$) about the organizational interpretive schemata by isolating doubts, reservations, and queries that employees and managers voiced about them, such as the following: "We realized that the place was too cool, too hip and too entrenched in being different from DPU. We had to change our thinking" (interview, manager/broker 1, March 2, 2004). $Trials_2$ were identified as individuals' actions to resolve questions and concerns about the schema: "Rather than impose templates on the Consortia, we are trying to make them see how their work can benefit from using work tools. We are no longer imposing templates; we are creating incentives to use them" (interview, Secretariat employee 2, April 2, 2003).

[1] We identify LLD employees by referring to the numbers in the overview of our informants in Table 1. We used these numbers to manage our data and keep our informants anonymous.

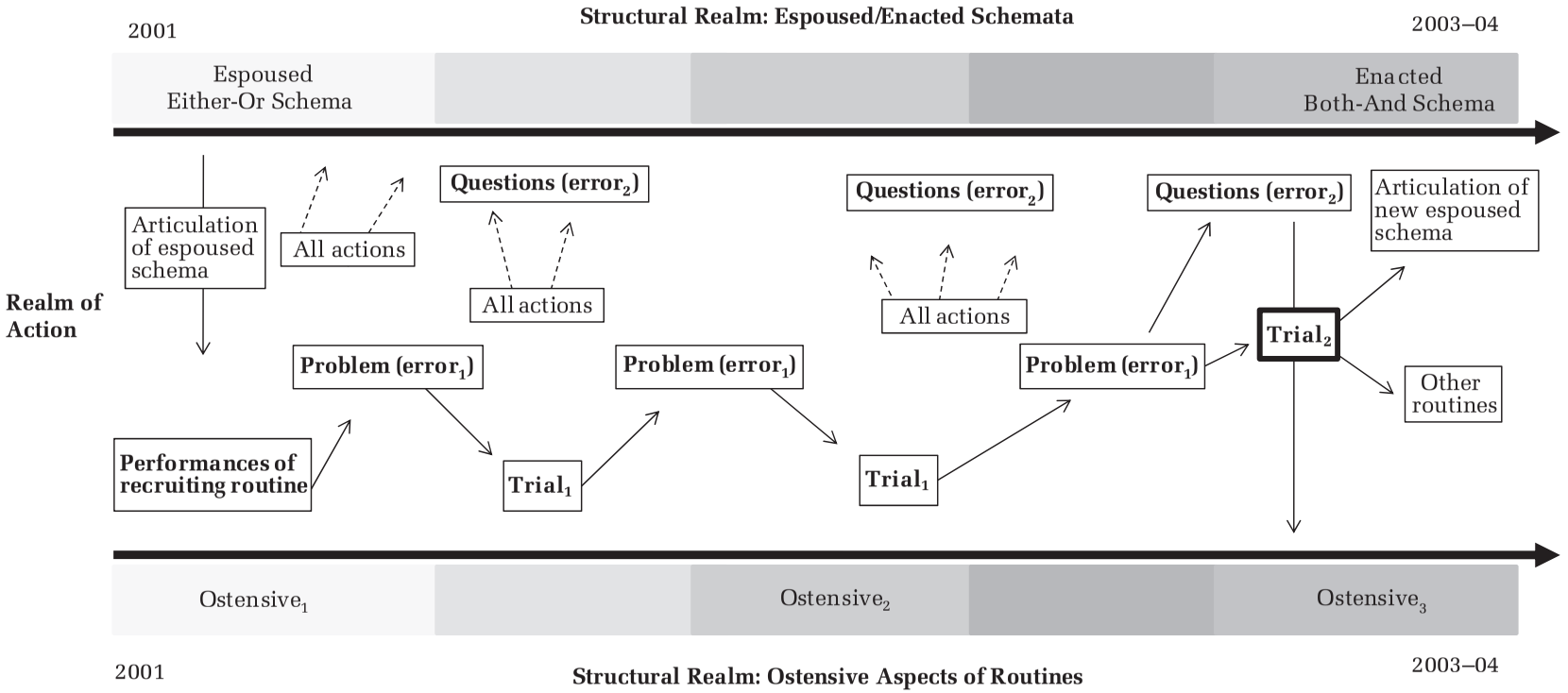
THE LEARNING LAB DENMARK CASE

We present our findings about LLD through two narratives. Narrative 1 focuses on the contracting subroutine of the larger recruiting routine. Narrative 2 focuses on the welcoming subroutine of the larger recruiting routine. These narratives let us show how enactment of the recruiting routine affected enactment of the organization's espoused schema. Following these narratives, we trace the trial-and-error learning processes that connect the way the schema and routines were enacted.

Figure 2, a process overview of our second-order constructs and aggregate themes from Figure 1, emphasizes the role of actions (both performances of routines and other actions) and trial-and-error learning in creating two conceptually distinct structures: the ostensive aspects of a routine and an enacted organizational schema. We drew on Barley's (1986) research for inspiration on how to depict the interactions we found in our data. Barley's (1986: 82) figure showed the relationship between the "institutional or structural realm" and the "realm of action." In our figure, we separate this institutional realm into two structures, ostensive aspects and espoused/enacted schema, each of which is constituted through the realm of action. This allows us to indicate that different microprocesses connect actions with the different structures. Also, the progressively darker color of the bars depicting schema and ostensive aspects signifies the gradual changes that took place as the recruiting routine and the interpretive schema were enacted. The higher-order structure, the schema, is constituted from a broader set of actions than the lower-order structure, the ostensive aspects of routines, and the two are constituted through different trial-and-error learning processes. The midsection of Figure 2, the realm of action, represents our microfoundation of observable action through which structures are enacted.

The realm of action in our study includes the specific actions people in the organization took, separated into our second-order analytical categories of performances, broad-based actions, $trial_1$ and $trial_2$, and $error_1$ and $error_2$ (problems and questions). The box at the bottom left of the midsection, labeled "Performances of recruiting routine" indicates that specific actions are performed multiple times to constitute ostensive patterns. These performances differ slightly from one another, but not enough to be considered new trials. Performances of the routine are some of the actions

FIGURE 2
Theoretical Model of Trial-and-Error Learning Process



that constitute the enacted schema, indicated in Figure 2 in the boxes labeled "All actions." The lines are dotted to indicate that although all actions potentially contribute to the enacted schema, neither observers nor participants see all actions as equally relevant. It follows that the enacted schema is constituted of multiple instances of actions taken to create ostensive aspects of multiple routines (e.g., recruiting, mailing, reimbursement, hotel booking) as well as multiple instances of broad-based action taken to accomplish work that is not part of routines (e.g., developing a communication strategy, working with an architect). Given the space confines of a journal article, we focus on the relationship between actions taken to accomplish the recruiting routine and how these actions relate to both the ostensive aspects of the recruiting routine and the enacted schema.

Questions appear several times in Figure 2, though $trial_2$ only appears once. This is consistent with our observations. LLD employees raised questions about the interpretive schema often throughout the period of observation, but they did not all lead to $trial_2$. However, when problems and questions generated $trial_2$, these experimental actions brought about change in several routines, and members of LLD articulated a new espoused schema. $Trial_2$ is placed higher in the figure to indicate that it addresses issues related to the realm of schema as well as issues related to the realm of routine, and $trial_2$ is depicted in bold to indicate that it influences a broader panoply of actions and interactions than $trial_1$.

We now present our data in two thickly descriptive narratives. We also provide an overview of trial-and-error learning for each narrative, Figure 3 for narrative 1 and Figure 4 for narrative 2. Table 2 gives supporting data for narrative 1, and supporting data for narrative 2 appear in Table 3. The figures depict the connections between the enactments of both routines and schemata and the role that trial-and-error learning plays in these enactments. Throughout the narratives, we point to examples of raw data in Tables 2 and 3. For clarity, we label each example with a capital letter. For instance, examples A and B in Table 2 support the espoused schema.

Narrative 1

LLD started out with a clearly espoused organizational interpretive schema casting it as an entrepreneurial research organization that was to act like a private organization even though it was in the public sector (see A and B in Table 2).

LLD's founding managers and board interpreted the founding legislation as a mandate to create a "hip," inspiring organization that would attract experts to work together creatively on short-term projects with more immediate social and practical relevance than most projects in typical academic or bureaucratic organizations have (see Figure 3). LLD's espoused interpretive schema was thus defined in part by what LLD would not be (see A in Table 2).

> LLD is defined by a central dichotomy: cutting edge versus state of the art. "State of the art" is about repetition, accumulation of knowledge, rational optimization, refinement, about what is safe. . . . *This is not what LLD is about.* Being "cutting edge" is about the exploration of unlit recesses, about daring, about the challenging and crisscrossing of established borders (internal document, "It's about learning," July 19, 2001; emphasis added).

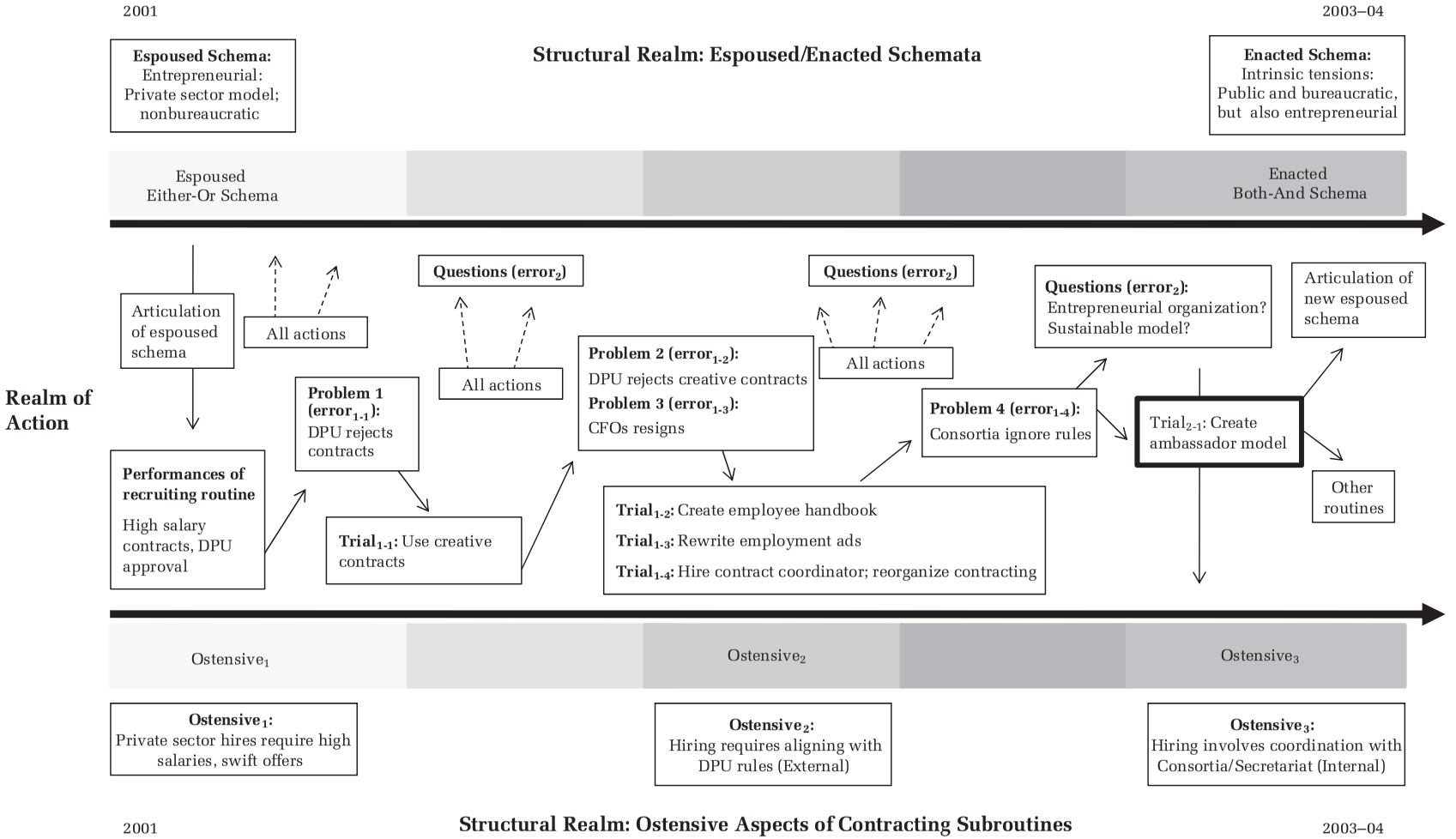
An important initial set of actions that this espoused schema influenced involved the recruiting routine. LLD needed to hire a lot of people quickly to enact this schema. The two senior managers and the board, for example, believed it was important to hire people who were "alternative" and to offer them "attractive" salaries. "[Board member X] stressed that it will be important to get candidates from the private sector, to point out the style and working method of LLD" (minutes of board meeting, March 26, 2001). The first several hiring processes followed this template, and an ostensive pattern emerged in which LLD placed ads in venues seen by people who were likely to be creative and entrepreneurial, conducted fairly ad hoc interviews, offered high salaries, and had people quickly join it (see C and D in Table 2).

Problems arose with this recruiting routine when DPU, the bureaucratic organization in which LLD was embedded, objected to the salaries that LLD was offering (see E and F in Table 2). These objections significantly hindered LLD's ability to enact its imagined recruiting routine, because people could not be paid if DPU did not approve their contracts. Neither the high salaries nor DPU's objection were problematic, however, from the perspective of LLD's espoused schema. Being at odds with DPU was a relatively straightforward extension of the notion that LLD would operate in ways that were nontraditional and in opposition to bureaucratic, academic organizations (such as DPU).

In response to the problems with completing the routine, and in keeping with the espoused schema, LLD's members began to use a form of contract, the TAP,[2] that was normally used for administrative

[2] "TAP" stands for "teknisk administrative personale" (technical administrative personnel). "VIP" refers to "videnskabeligt personale" (scientific personnel).

FIGURE 3
Trial-and-Error Learning Process Overview for Narrative 1[a, b]



[a] See Table 2 for supporting data.

[b] In Methods, we defined two types each of trials and errors using a subscript 1 or 2. In Figures 3 and 4 and Tables 1 and 2, we link each trial or error to a problem with an additional subscript number (e.g., "trial 1-1").

TABLE 2
Data Supporting Trial-and-Error Learning Process Overview for Narrative 1[a]

Second-Order Theme	Supporting Evidence
Espoused schema	
Entrepreneurial: Private sector model; nonbureaucratic	A: "Our aim is to be different from public organizations. Usually, such organizations are slow, dusty, unprofessional, and bureaucratic. . . . LLD wants to be a service-oriented, flexible, nonbureaucratic, and professional organization." (interview, manager/broker 1, February 5, 2002)
	B: "LLD and DPU are very different organizations. Man-woman. North-south." (interview, Consortium employee 10, November 6, 2001)
Ostensive$_1$	
Private sector hires require high salaries, swift offers	C: The two senior managers were looking for individuals that matched the following characteristics: "Flexible, innovative, creative, open minded, courageous, international and interdisciplinary." (power point presentation, "It's about Learning." June 15, 2001, slide 9)
	D: "The salary question will be of great importance for us, because some of the applicants come from good jobs and interesting careers. [The managing director] has made an appointment with [person X] (DPU) who has promised to help us 'put a package together.'" (minutes of board meeting, May 9, 2001)
Problem 1 (error$_{1\text{-}1}$*)*	
DPU rejects contracts	E: "DPU is sabotaging LLD (by rejecting contracts] because the relationship between the two organizations has been unclear." (interview, CFO, April 9, 2002)
	F: "Usually, when we hire we have problems in the interface with DPU. That's why they return the contracts." (field notes, comments made by Secretariat employee 1, general development meeting, June 2002)
Trial$_{1\text{-}1}$	
Use creative contracts	G: "The Consortia are still very much in the pioneering phase . . . they make things up as they go along and only refer to 'standards' if they have to, or if there's a problem. . . . Conforming too much to procedures inhibits creativity and runs counter to LLD's mission." (interview, manager/broker 6, February 2002)
	H: "We were supposed to be different from DPU so in our mind it was crazy that a set of their procedures prevented us from hiring the cool people we wanted. . . . If we had to follow DPU's procedures it would take six months to hire a VIP. That was too long. It prevented us from moving fast and act on leads. . . . Then we became creative because it was ridiculous. Almost like a joke that we could not take seriously. . . . From one perspective it was inappropriate [to use TAP contracts to hire VIP employees] but it was also our ability to look by the rules and regulations that gave us our dynamism and speed." (interview, manager/broker 1, January 19, 2008)
Problem 2 (error$_{1\text{-}2}$*)*	
DPU rejects creative contracts	I: "When it becomes clear that LLD is not as independent as we thought but instead [we] are a subunit of DPU, the wiggling room in our salary policy is significantly reduced. The union starts to compare the salary of its members across units and argues that the salary at LLD should [be rolled out] across DPU. . . . This is unacceptable to DPU [and they reject our contracts]." (interview, research director, January 18, 2008)
Problem 3 (error$_{1\text{-}3}$*)*	
CFO resigns	J: "We are looking for a new Chief Financial Officer. . . . It is important that you enjoy being the central hub of a small organization, and enjoy working with others in an interdisciplinary, creative and hectic environment." (ad in *DJOF Bladet* [20/2] 2002)
	K: "Our controller/CFO quit his job, so I had to handle a number of hires. I am really looking forward to being released from these responsibilities again [when we hire a new CFO]. You have to be pretty patient to deal with the public bureaucracy, especially when it comes to recruiting and salary issues. Huuhhe. I can do it, but I don't think it is fun." (e-mail, manager/broker 1, November 19, 2002)
Trial$_{1\text{-}2}$	
Create employee handbook	L: "I am working on developing a manual so we will hire and introduce new employees in a more professional way. Currently, it's a mess." (field notes, comment made by manager/broker 1, Monday morning meeting, January 25, 2002)

TABLE 2
Continued

Second-Order Theme	Supporting Evidence
Trial$_{1\text{-}3}$	
Rewrite employment ads	M: "Compensation and conditions of employment will be a subject of negotiation." (ad downloaded from LLD's website, August 1, 2001)
	N: "Compensation and conditions for employment will be negotiated *in accordance with existing rules and regulations*." (ad in *PsykologNyt* [16] September 6, 2002; emphasis added)
	O: "Salary and terms of employment accord with existing regulations and agreements between the Danish Ministry of Finance and AkademikemsCentralorganisation [a union]. A supplement may be awarded to a person with the right qualifications." (ad in *DJOF Bladet* [20] 2002)
Trial$_{1\text{-}4}$	
Hire contract coordinator, reorganize contracting	P: "In the Secretariat we have been working on staffing a couple of positions that deal with personnel and employment. However, here it has also been difficult to plan and organize our work because it turns out that we will be hiring much more than we expected and more on an ongoing basis. As a result, we need to streamline this function more than if hiring was just a one-off even here in the founding period. We are hiring Ph.D. students on a regular basis and the VIP hires are really heavy, so we are talking about hiring a person on half-time that will deal with recruiting and coordinate with DPU." (interview, CFO, September 16, 2002)
	Q: "On January 3rd X started working 15 hours a week on individual contracts. All information regarding recruitment will go through her." (e-mail from managing director to all employees, January 10, 2003)
Ostensive$_{2}$	
Hiring requires aligning with DPU rules (external)	R: "Hiring a VIP [faculty/researchers] employee in the public sector is a very laborious and complicated process. . . . Many details need to be aligned or otherwise DPU would send the contract back as 'incomplete.' Recommendation letters. Transcripts. A statement justifying the candidate's level of professional competence or otherwise DPU would not be able to pay any supplements." (interview, Secretariat employee 9, January 18, 2008)
	S: "The hiring procedures are not being followed because there are many people that have an individualistic approach to their work. And that is one of LLD's strengths but the downside is that it can be hard to make people follow procedures. In some situations this generates not only delays but also a lot of extra work, for example, if we need to comply with certain laws from DPUs administration. DPU controls the legality of all employee contracts. Extra work involves getting acquainted with various deadlines, requesting various documents, and filling out paperwork. . . . But when procedures are not being followed misunderstandings often occur very rapidly. It is not clear who is doing the specific task that needs to get done to hire a person. The recommendation for hiring a new employee arrives too late, important documentation is missing, and all that delays the actual contract for hiring the employee, and thus also the payment of salary. It all generates extra work in our administration but also in DPU's department for salary, and of course also for the new hire." (e-mail, Secretariat employee 9, October 3, 2003)
Problem 4 (error$_{1\text{-}4}$*)*	
Consortia ignore rules	T: "The rules and DPU represent the old system. We are not supposed to be like them. We don't want to be like them. Look around. We have a piano. Cool pictures on the web. A soccer game. Toys and games on the walls. What do you think? Are we not different than DPU?" (interview, Consortium employee 9, February 6, 2003)
	U: "Ironical bursts such as 'where is the procedure for making coffee' reveal that deep down we don't like effort by the Secretariat to standardize our work. In the Consortia, we don't want to be treated as cattle that willingly accept to be directed in the same direction. We stand by our right to be individualistic–the right to 'find our own way.'" (e-mail, Consortium director 5, October 2, 2003)
Questions (error$_{2}$*)*	
Entrepreneurial organization? Sustainable model?	V: "We realized that the place was too cool, too hip and too entrenched in being different from DPU. We had to change our thinking." (interview, manager/broker 1, March 5, 2004; statement confirmed and elaborated in follow-up interview, January 18, 2008)

TABLE 2
Continued

Second-Order Theme	Supporting Evidence
	W: "The changing way of thinking [about following DPU's rules] expresses that we are a young organizations that is trying to find our own legs to stand on and therefore has a constant need to reformulate who we are. . . . Because we are still figuring out the waters we are sailing, there has been a change in the perception of what it is that we do as an organization and how we do it." (interview, Consortium director 1, April 16, 2003)
$Trial_{2\text{-}1}$	
Create ambassador model	X: The ambassador in each Consortium will be responsible for selling the procedure in the Consortium and has the skills to carry it through. The model has three elements. One is where the Secretariat goes to the Consortium on an ongoing basis. The Secretariat trains people and builds their skills. The second element is day-to-day contact where the ambassador can come to the Secretariat and ask specific questions about how to do things. The idea is that the Secretariat does not do their job as the Secretariat used to do—the Secretariat helps them. The last part is monthly status meetings where we have a structured dialogue about how to improve work." (interview, manager/broker 5, April 2, 2003)
	Y: "The Secretariat wants to serve two functions. The police function where we check that specific tasks are accomplished in compliance with work—tools, rules, laws, and regulations. The support function where we help the Consortia identify problems they might have and then find a solution so they can do their work easier and more effective." (interview, manager/broker 2, March 5, 2004)
Ostensive	
Hiring involves coordination with Consortia/Secretariat (internal)	Z: "In response to Learning Lab Denmark's growth, we suggest moving the broker teams (IT, Communication, and Culture) to what we call an 'Ambassador Model.' The overall idea is that a basic distinction can be made between fixed tasks that brokers do and tasks that naturally belong with researchers or other consortia staff, aided by brokers." ("The Broker Role—Adapting to LLD's Growth," May 2003)
Enacted schema	
Intrinsic tension: Public and bureaucratic, but also entreprenurial	AA: "Two-organizations-in-one-situation; new, young, impossibly cool place to work that is part of the state system—old, bureaucratic, impossibly uncool place which controls the money and makes the rules." (e-mail, broker 6, October 3, 2003)
	BB: "Sometimes I feel we are fighting a losing battle, and that it's just a matter of time before the rest of my hair falls out. And yet on my 'good hair days.' I wonder whether there is some way that the dialogical ideal of emergence and the bureaucratic one of predictability can work together." (managing director, in *LLD Quarterly,* 2004 [1])

[a] See Figure 3 for the overview for narrative 1.

rather than academic employees and did not have the same restrictions as the academic (VIP) contracts did. This trial performance reinforced much of the recruiting routine's ostensive pattern but also altered it somewhat. Recruiting continued to be organized in ways that made it possible to hire people quickly and to hire people who were not tied to the academic calendar or to publishing articles in academic journals. Offering high salaries and obtaining quick contract approval were still important parts of this routine. The change came in how LLD gained approval for the high salaries by using TAP contracts.

This solution temporarily solved the problem, and several of the TAP contracts were approved (see G and H in Table 2) before DPU realized that LLD was using these contracts to get around DPU's rules regarding salary levels. It then stopped approving these contracts, which made the recruiting routine problematic again, because LLD could not complete the recruiting process unless DPU approved the contracts (see I in Table 2). "LLD is tied to DPU and the rules this institution represents. . . . How much LLD can offer a person in salary is, for example, tied to DPU" (interview, member of LLD's White Paper Working Group, September 12, 2002). During this period, LLD's problems with the recruiting routine were exacerbated when two successive CFOs, who were then responsible for negotiating employment contracts with DPU, resigned (see J and K in Table 2). This combination of problems meant the recruiting routine was seriously crippled when LLD needed to hire a lot of people. "All the DPU rules are driving me crazy. There are so many forms that need to be filled out. It's a nightmare to hire people" (field notes, February

5, 2002, informal conversation with Consortium director).

People working in LLD's Secretariat generated several new performances to solve the problems with the recruiting routine. They wrote an employee handbook (see L in Table 2), which promoted a professional approach to hiring by summarizing the documentation needed to submit a complete contract to DPU (e.g., letters of recommendation, official transcripts). They also rewrote employment ads to emphasize the importance of existing rules and regulations (see M, N, and O in Table 2). Further, they hired a contract coordinator who was responsible for ensuring that LLD's employees had contracts and were being paid. Having someone who performed these tasks helped the organization ensure that changes proposed in the employee handbook would be enacted (see P and Q in Table 2). These new trials helped to constitute new ostensive aspects in which members of LLD conducted recruiting in a more traditionally bureaucratic manner. Forms were filled out, rules were followed, and DPU's control over salary levels became an accepted part of the recruiting routine (see R and S in Table 2).

But fixing problems with the recruiting routine changed it, and the changes challenged the organizational interpretive schema. The routine no longer enacted the opposition to traditional, public bureaucracies that was intrinsic to the schema espoused in 2000 and early 2001. The bureaucratic performances called this schema into question and did so increasingly as LLD rapidly hired new employees, growing from 12 to 60 people in 2002–03. At the same time that the recruiting routine was changing, many other routines were also being enacted in LLD. Some of these (e.g., the mailing, reimbursement, and hotel-booking routines) raised challenges to the espoused schema similar to the challenge posed by the newly bureaucratic recruitment routine. Other routines that LLD people enacted were more consistent with the espoused schema (routines for organizing annual conferences, "Culture Camp," and events at Academy of Management meetings).

The disjuncture between the espoused schema and certain actions meant that questions began to arise in both the Consortia and the Secretariat about the schema and whether it was sustainable (see V and W in Table 2). Moreover, members of the Consortia started to ignore the rules (see T and U in Table 2). During a 2003 meeting, one Consortium director said: "I believe LLD was supposed to be a decentralized, innovative, alternative organization rather than a centralized bureaucracy. I took this job because I was told LLD would be different from other public organizations." The members of LLD appeared to be in a quandary. Did they enact their vision of an alternative research organization, or did they enact a recruitment routine that worked? They resolved this dilemma by enacting both.

The Secretariat, which had more administrative responsibility than other areas of LLD, had come to be associated with the more bureaucratized performances that were inconsistent with the espoused organizational interpretive schema. The Consortia, which conducted the research projects, continued to hew more closely to the nontraditional espoused schema and resisted the bureaucratization. A Consortium member said: "Since November 2001, the focus has been on building a lot of [administrative] machinery. . . . I don't know what we are going to use all the machinery for because we are a small, entrepreneurial organization" (interview, April 2002).

Secretariat personnel proposed a model of interacting that allowed their department to maintain many of the bureaucratic solutions that were developed to make the recruitment routine (and other routines) work and also maintained some of the important features of the espoused schema. They called this the "ambassador model" because it involved the creation of "ambassadors" who could negotiate the disjuncture between LLD's espoused schema and the new trials that were required to have effective task-specific routines (see X and Y in Table 2). The ambassador model promoted new performances for many of LLD's routines, including recruitment. These actions were reflected in the altered ostensive patterns of the routines. For example, when LLD was founded, the Secretariat was conceived of as a service unit that would do all the hiring, and the Consortia were regarded as consumers of this service. After the ambassador model was introduced, the ostensive pattern evolved to include collaborative coordination in which the Consortia and Secretariat shared responsibility for recruiting and certain other activities (see Z in Table 2).

The ambassador model responded to the questions about the organizational schema because it entailed a new way of enacting it that integrated the bureaucratic performances of the recruiting routine with the "alternative" performances that characterized the research projects. At this point, a new espoused schema emerged in which LLD strove to combine the strengths of a bureaucratic organization with the more alternative form that characterized the initially espoused organizational schema (see AA and BB in Table 2). A report on LLD's progress summarized the new espoused schema:

> Both parties [LLD and DPU] will, in the future, depend on creating mutually stimulating cooperation. This cooperation must *not* take the form of transforming LLD into a conventional university department. That would be the death of LLD, given the perspectives and visions outlined in the development contract. (Levin, 2004: 39; emphasis added)

Narrative 2

Our second narrative provides another look at the recruiting routine and the relationship between its development and the organizational interpretive schema. Whereas the first narrative focused primarily on the contracting subroutine of the larger recruitment routine and LLD's conflict with DPU, the second narrative focuses on the "welcoming" part of the routine and issues internal to LLD. Welcoming consisted of a sequence of mundane practical actions, including sending flowers to a new employee, preparing a computer, getting keys and a final contract ready, and giving the employee a tour. This second narrative shows that the interaction of the routine and the schema occurred in situations other than LLD's conflict with the external environment (e.g., DPU), as the problems ($error_1$) and questions ($error_2$) that emerged in this narrative occurred primarily within LLD.

The managing director and the broker/manager in the Secretariat envisioned LLD operating as a "family" rather than as a traditional organization (see A in Table 3). For them, the espoused family schema entailed informal interactions that would help employees transcend intellectual boundaries between projects.

> We need to build some stories together that will make us a family. We recently went away on a "Culture Camp" for a couple of days to generate some collective stories. One eats dinner together. . . . One sits and works together, one asks questions, and one gets to know one another more privately. (interview, managing director, November 5, 2001)

The espoused family orientation was part of the broader design of LLD as an open and welcoming space. The two senior managers hoped to distance LLD from DPU—an institution known for its dull, gray surroundings—by having a workspace that was open, warm, well lit, and uplifting (Barry & Rerup, 2006: 269).

The espoused family schema had implications for the recruitment routine that were evident in the initial ideas about welcoming (see Figure 4). LLD's managers imagined a welcome that made people feel like integral members of the group (see B and C in Table 3).

> They are welcomed in a very nice way, I mean, it starts on their first day when they receive a big bouquet of flowers, they get a "canal tour," as we called it, where we take them on a tour of LLD, and a follow-up meeting is scheduled to make sure all practical matters are in order so they can focus on their work. (interview, manager/broker 1, January 18, 2008)

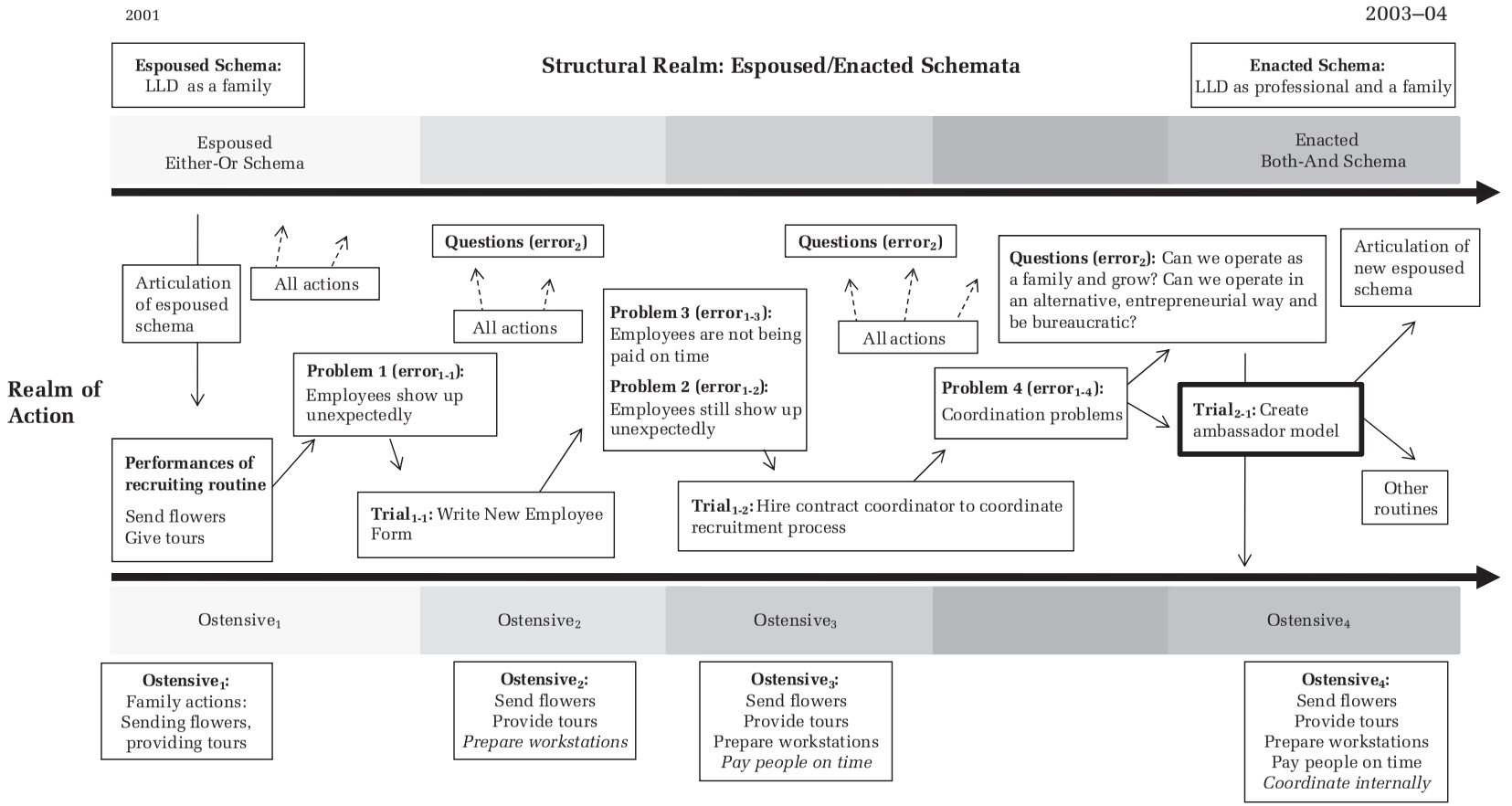
Sometimes the welcome worked well, but sometimes problems arose. Because many people were being hired and many people were hiring, the culture team in the Secretariat, which was supposed to enact the welcoming routine, was not always notified that someone new was scheduled to arrive (see D in Table 3). When this happened, there were no flowers, various practical matters fell through the cracks, tours were not as welcoming as they might be, and members of the Secretariat were embarrassed (see E and F in Table 3).

People responded to these problems with new actions ($trial_1$) that created new patterns of the welcoming routine. Specifically, the Culture Team developed a "new employee form," to be filled out by the Consortia, informing the team as to the exact day an employee was to arrive and indicating whether a work space, cell phone, business card, keys, and an access card were needed (see G and H in Table 3). These changes in performing the welcoming routine may seem minor, but they entailed a degree of work flow standardization and coordination between different parts of LLD that had not previously been enacted (see I, J, and K in Table 3). These new performances created a new, more bureaucratic, ostensive pattern for the welcoming routine.

Despite these actions, new employees continued to show up without LLD seeming to be ready for them. Such events made these individuals feel unwelcome and made Secretariat personnel feel unprofessional (see L in Table 3). In addition, DPU was not approving contracts, and employees were either not being paid at all or not receiving the salaries they were promised (see M and N in Table 3). "We realized that we could give them [new employees] all the flowers in the world when they started, but if there was no contract, if the foundation for their affiliation to LLD was incomplete, then all the other welcome stuff did not matter" (interview, manager/broker 1, January 18, 2008).

Efforts to welcome employees expanded to include making sure that people had approved contracts and were going to be paid. A contract coordinator was hired to oversee the hiring process and negotiate and coordinate with DPU to get contracts approved (narrative 1 and P in Table 2; O in Table 3). Consortia directors, who did most of the hiring, were to implement contracts through the contract

FIGURE 4
Trial-and-Error Learning Process Overview for Narrative 2[a]



[a] See Table 3 for supporting data.

coordinator, who was part of the Secretariat. This change improved the welcoming routine not only because it ensured that people would be paid (see P and Q in Table 3), but also because it helped provide timely information that allowed the Secretariat to prepare for newcomers.

The welcoming routine's ostensive pattern now integrated, at least in part, coordination within LLD and between LLD and DPU. The Consortia directors, however, resisted the Secretariat's efforts to control their behavior because they considered the bureaucratic control approach to coordination inconsistent with LLD's espoused schema as alternative. As a result, they ignored the efforts of both the contract coordinator and the Secretariat to coordinate. Attempts to enact the welcome routine continued to fail (see R, S, and T in Table 3). The increasing amount of standardization and coordination in the welcoming routine, and the resistance from the Consortia, led LLD's members to raise questions about the organizational interpretive schema that initially focused so heavily on organization members being like a family (see U in Table 3). Indeed, they questioned what it meant to operate like a family: "We are supposed to be one big family. We should cook our food together, speak together, hang out together, and be social. But in practice it does not work. Everybody is doing their own thing" (interview, Secretariat employee 3, February 5, 2002).

The ambassador model, described in narrative 1, was an experiment that addressed these questions about the schema. It created forms of communication between the Consortia and the Secretariat so that they could coordinate the workable solutions each had developed rather than having to do things either the Secretariat's way or the Consortia's way (see V, W and X in Table 3). The model was designed to create performances that would maintain much of what people thought was important about the initial espoused schema, but integrate some of the traditional, even bureaucratic, ways of operating that had increasingly been adopted. With respect to the welcoming routine, for instance, LLD dropped the notion of operating as a family but kept sending flowers to new employees (which was not standard practice in Danish universities). When people acted in these new ways, the welcoming and contracting routines became more effective, while retaining some distinctive qualities.

The new actions embedded in the ambassador model were reflected in the ostensive pattern of recruitment. The new ostensive pattern that emerged was different from the pattern in 2001, when welcoming was centralized within the Secretariat. It had become a distributed activity that involved the contract coordinator and people in the culture team, IT team, Consortia, and DPU (see Y and Z in Table 3).

The new espoused schema deemphasized the family metaphor and focused instead on the importance of working professionally and entrepreneurially (see AA, Table 3). Members still focused on valuing employees but saw bureaucratic procedures as a useful way to manage the organization. "We had a metaphor where we were one big family, but our managing director had to . . . drop it. . . . We have a service function [the Secretariat] that is much better than DPU, so we are keeping some of their procedures [sending flowers] even if it involves some extra work because we do not want DPU to do it" (interview, Consortium director 1, May 1, 2003).

ANALYSIS OF NARRATIVES

In the following analysis, we use the second-order concepts presented in Figures 1, 2, 3, and 4 to understand how trial-and-error learning influenced the enactment of LLD's espoused schema. By carefully separating the narratives into relationships between our two core aggregate themes, schema and routine, we became better able to see these processes. We show how both the ostensive aspects of routines and the enacted schema develop through the actions (e.g., performances of the recruiting routine) taken to enact routines, and actions (e.g., $trial_1$) taken to deal with problems (e.g., $errors_1$) that arose in enacting these routines. Moreover, we show how the enactment of routines raised questions (e.g., $errors_2$) about how the espoused schema was being enacted and presented an opportunity for taking actions (e.g., $trial_2$) that supported a new espoused schema more consistent with the schema that had been enacted. The enacted schema in Figures 3 and 4 not only represents the enacted version of the initial either-or schema espoused by the two senior managers and Wetware in 2001, but also forms the basis for articulating a new espoused schema that members of LLD could continue to enact. Given space constraints, our narratives and analysis end with the creation of the ambassador model as a foundation for simultaneously incorporating actions from the initial espoused schema and the more bureaucratic schema that had been enacted.

Routines

The recruitment routine can be represented as comprising several actions, including (1) advertis-

TABLE 3
Data Supporting Trial-and-Error Learning Process Overview for Narrative 2[a]

Second-Order Theme	Supporting Evidence
Espoused schema	
LLD as a family	A: "Our vision is that we are a family that should function well in a relaxed manner while at the same time accomplish what we do in an effective and professional way. We can't resemble a public bureaucratic organization. Things need to happen fast. It needs to be effective." (interview, manager/broker 1, February 5, 2002)
Ostensive$_1$	
Family actions: Sending flowers, providing tours	B: "You don't get flowers very often in Denmark so it symbolizes something big and important but also private and personal. We send flowers on the first day because it plays an important role in a job context where we try to see people as human beings that are valued. . . . It is a personal way of welcoming people." (interview, Secretariat employee 4, January 18, 2008)
	C: "On one of your first days at LLD, we will give you a guided tour of the buildings and introduce you to your new colleagues." (LLD *Staff Handbook,* 2007)
Problem 1 (error$_{1\text{-}1}$*)*	
Employee show up unexpectedly	D: "I guess about ten people have showed up [unexpectedly]." (interview, Secretariat employee 4, April 10, 2002)
	E: "We often realize the need for developing new employee procedures too late—when we are standing in the reception with a new employee, and we ask: Where is he going to sit? Do we have a PC for him? What about flowers? . . . We need to develop a procedure for welcoming new people because we have so many people that are here for only a short period." (interview, manager/broker 1, February 5, 2002)
	F: "It was chaos and anarchy and coincidence, total happenstance, how things ended up, and it made us realize that there were employees that started under really bad conditions. [We could not welcome them in a nice way] and they did not have their contract, yet. No one really knew anything about them and that made people angry and the Secretariat look really, really unprofessional because we did not have the situation under control." (interview, manager/broker 1, January 18, 2008)
Trial$_{t\text{-}1}$	
Write New Employee Form	G: "Today we are spending time on things that are unnecessary. Applications are incomplete. People show up out of the blue. That's why we [Secretariat] are asking for your [in the Consortia] help to identify the recruiting procedures that you need most to run your things smoothly." (field notes, comments made by manager/broker 1, general development meeting, June 12, 2002)
	H: "A number of new people has started the last month and in order to secure a 'flying start at the lab' it is crucial that the recruiter fills out a 'New employee form' in order for IT and Culture Team to take care of all practical issues before receiving the new employee at the lab." (*Culture News,* June 2003)
Ostensive$_2$	
Send flowers Provide tours Prepare workstations	I: "We need to get all the IT procedures streamlined. We are having a meeting about it this week. It means that we describe, step by step, how a computer is made ready for a new employee. We are trying to create a routine. I introduce all new employees so I need to know if they are getting a computer, what kind of software that needs to be on it, the various LLD fonts and templates for letters and memos, e-mail etc. Getting all this ready before the employee arrives make it easier for me to welcome them because I can just say: 'use what is on the computer, don't install anything yourself.'" (interview, Secretariat employee 4, September 9, 2002)
	J: "Not knowing when people arrive is also a problem for us in IT because we need a couple of days to configure their computer." (field notes, comment made by manager/broker 4, general development meeting, June 12, 2002)
	K: "New people are met with professionalism when they arrive. It is structured. There is time to show you around, there are flowers for you, there is a PC for you, and a work space. When a person arrives we know about it now because we have made a procedure. . . . It is very different from before where there was some confusion: 'Oh God is that a new person that is arriving, why has no one informed us.' Today, new employees are being met with a different form of professionalism, a different kind of joy." (interview, Secretariat employee 4, September 9, 2002)

TABLE 3
Continued

Second-Order Theme	Supporting Evidence
Problem 2 (error$_{1\text{-}2}$)	
Employees still show up unexpectedly	L: "I had no clue about that some of the new employees were arriving. It is quite unfortunate to sit in the reception and then a person walks in and says: 'I am starting today.' It is very unpleasant for both parties. Some of the people that arrive are not employees but students that write their master's thesis. They are sitting here while they finish their degree. And one day a student arrived that I had never heard anything about and I find that absurd. It is part of our culture that he is going to be here. So, we also need to welcome him in an appropriate way." (interview, Secretariat employees 8, June 12, 2002)
Problem 3 (error$_{1\text{-}3}$)	
Employees are not being paid on time	M: "There has been a hole in our welcome procedure. Because it is clear that it generates a lot of precariousness and insecurity for the Consortium directors and their employees when the contracts are not finalized, when people don't know if they will receive their salary, and when they don't know how much they are going to be paid. It is a bad start. It is a really bad start and it does that people start by not [feeling welcome] and trusting LLD." (interview, manager/broker 1, February 6, 2003)
	N: "The payment of wages is in complete disarray—many people are having issues with getting their supplements." (interview, Secretariat employee 4, April 10, 2002)
Trial$_{1\text{-}2}$	
Hire contract coordinator to coordinate recruitment process	O: "We hire a contract coordinator because it turns out that some of the Consortia directors have hired some people, but they did not completely understand how the employment had to be done. This happened, in part, because LLD was growing very fast. In 2001 I think many people expected that if the lab was doing really well we would be between 15 and 20 people. But already in 2003 we are more then 40 people, and suddenly the number of people that needs to be hired is very big because we have many projects. We are some core people but many are hired on temporary contracts. We need to streamline the process and that involves creating an interface with DPU." (interview, research director, January 17, 2008)
Ostensive$_{3}$	
Send flowers Provide tours Prepare workstations Pay people on time	P: "The recruiting procedure is not finalized because in welcoming people we also interface with the contract coordinator. But she needs a little more time to settle into her new job. . . . It is very clear that we have some problems. There have been some situations where our welcome has failed in a grim manner. People got angry because their contract was unfinished, they were not being paid, and all the practicalities were not in order." (interview, manager/broker 1, February 6, 2003)
	Q: "Everything is lagged at LLD. We have a slow response time to everything. It's a paradox. We are a young organization, but in some ways we act as if we are a very old organization. Things are slow or get slowed down because we are operating in a mess. The topic of today's general development meeting (being professional) will help to clean up this mess. The longer we wait to do these things, the longer we will find ourselves struggling to get out of the mess. Hopefully, this will be the end of dealing with salary issues and people working on nonfinalized contracts." (field notes, comments made by manager/broker 6, general development meeting, June 12, 2002)
Problem 4 (error$_{1\text{-}4}$)	
Coordination problems	R: "It is not clear who is doing what during recruitment. Sometimes the Culture Team is sending the welcome letter. Sometimes it is the Consortia. It is not a good idea to have this inconsistency because it may cause misunderstandings." (interview, manager/broker 1, June 12, 2002)
	S: "The tension between the Broker Team in the Secretariat and the Consortium directors goes back to 2001. It's related to whether the Broker Team is a 'service unit' that executes orders/requests issued by the Consortium directors or a 'techno structure' that can issue orders/requests to the Consortium directors and expect these requests to be implemented. The tension is related to three main issues: (1) power, (2) authority, and (3) hierarchical status. The more the Broker Team acts as if it is a technocratic structure the more the Consortium directors resist." (interview, manager/broker 6, April 2, 2003)
	T: "The interface with the Consortia directors was problematic. It was a by-product of the broker design. They were hovering around out here in the Consortia [informant draws a model] and had to make things happen while all the brokers were in here in the Secretariat and had to make all the practical stuff work. To make things worse, the directors did not have much respect for what we did—they basically did not care. This set-up generated problems because we would say 'Listen, you can't promise this person this salary because it needs to be approved by DPU' while the directors ignored us. That's why we ended up in situations where the directors promised a person a salary and said 'yes, yes everything is fine, you will start on Monday,' which is when we, in the Secretariat, learn about the contract. And then the whole contractual [nightmare] with DPU started, and it took a really long time, back and forth between DPU and LLD, and in some cases the end result was that people ended up being paid less than they had been promised by the Consortium director." (interview, manager/broker 1, January 18, 2008)

TABLE 3
Continued

Second-Order Theme	Supporting Evidence
Questions (error$_2$)	
Can we operate as a family and grow? Can we operate in an alternative, entrepreneurial way and be bureaucratic?	U: During a three-hour general development meeting on April 8th 2002, several employees challenge the family metaphor. First, if being an entrepreneurial organization means operating as a family and showing employees that "it"cares, what does it mean that the caring is increasingly institutionalized and formalized? A second and related question is about the meaning that has been attributed to being a family. Consortium employee 5 argues that the analogy is based on a romantic idea of harmony, love and peaceful coexistence, yet many families are dysfunctional and unhappy. The employee points this out by using a well known passage from Tolstoy's *Anna Karenina:* "All happy families resemble one another, each unhappy family is unhappy in its own way." (field notes, general development meeting, April 8, 2002)
Trial$_{2\text{-}1}$	
Create ambassador model	V: "In a perfect world, everybody would use the work tools and procedures we develop [for hiring]. But the world is not perfect. In the past, we wanted everybody to do certain things in certain ways. But we realized that it was not possible. Today, we are more open. Rather than impose templates on the Consortia, we are trying to make them see how their work can benefit from using work tools. We are no longer imposing templates, we are creating incentives to use them." (interview, Secretariat employee 2, April 2, 2003)
	W: "Recently, things have really started taking off at LLD. More and more people are brought on board to do research. This is great. However, it also suggests that we should re-think our internal way of organizing our work. This is so for two reasons: (1) The ratio of support staff to researcher has been falling, making it unrealistic that brokers can provide a high level of support. (2) As more activities take place at the consortium level, the original idea of the broker as working at the interface of consortia—as 'go-between'—becomes more important." ("The Broker Role—Adapting to LLD's Growth," May 2003)
	X: "One person—the ambassador—will be selected per consortium to be responsible for working with the broker team on IT, Communication and Culture. The responsibility of the ambassador is to be the local spokes- and competence person on the given topic. Brokers will then (1) Conduct monthly seminars for ambassadors on topics relevant to their work. Topics for seminars to be based on organizational needs. (2) Have monthly follow-up meetings with ambassadors, providing a basis for structural dialogue and feedback on all consortia activities. (3) Assist all consortia members through day-to-day interaction, which will be of a coaching nature." ("The Broker Role—Adapting to LLD's Growth," May 2003)
Ostensive$_4$	
Send flowers Provide tours Prepare workstations Pay people on time Coordinate internally	Y: "There are two groups of hiring procedures. Some procedures are completely internal to LLD. Others are external and involve DPU. Person X and person Z (contractor coordinator) should address the interface with DPU. Any procedure that is internal should go through person D in the Secretariat." (field notes, comments made by Secretariat employee 1, general development meeting, June 12, 2002)
	Z: "We need to communicate better with each other [when we welcome new employees]. . . . Sometimes when the Consortia ask us to do something it is very blurred and imprecise. It does not make sense. We [Secretariat] have become better at asking questions to clarify and reduce confusion." (interview, Secretariat employee 2, April 2, 2003)
Enacted schema	
LLD as professional and a family	AA: "We dropped the family metaphor when the organization expanded. In the beginning, everyone knew everyone . . . and had a personal connection. But at some point it was no longer possible to have that connection to everyone. . . . When you don't know the names of some of the people it does no longer make sense to talk about being a family. . . . Many of the people hired at LLD would never have been interested in being employed at DPU. [The people at LLD] had a set of values about where they wanted to work and how they wanted to work together, and those values were completely different from the values at DPU. When we expanded we continued to care for one another and being [entrepreneurial and professional] because it represented our values." (interview, manager/broker 1, January 18, 2008)

[a] See Figure 4 for the overview for narrative 2.

ing for new employees, (2) interviewing them, (3) selecting candidates, (4) making offers, (5) writing contracts, (6) submitting contracts for approval at DPU, and (7) preparing for the arrival and welcoming of the new employee ("VIP and TAP Recruitment and Contract Prolongation," October 2003). These actions occurred roughly in this sequence and involved interdependent actions by multiple

people. This representation of the routine, however, leaves out much of the detail about how these actions were performed and how the ostensive patterns formed.

Prior to any recruiting, LLD's managers envisioned the actions necessary to enact the contract and welcoming parts of the routine. As these envisioned actions were enacted, problems emerged. Participants then adjusted to these problems.

Actions/performances. "Actions" are necessary to transform rudimentary ideas about what needs to be done and how it should be done into routines. A "performance" denotes a set of actions people take as they enact a routine. New performances ("$trial_1$") emerge in response to problems ($error_1$). Because any one performance is somewhat different from all of its predecessors, all performances can be considered trials. We prefer, however, to use "performance" only to denote times when people try to do the same thing they did before and "$trial_1$" for times when they experiment with a new action in an effort to create a routine for the first time or to solve some problem with the routine.

Problems ($error_1$). Problems emerge when people enact routines but either cannot complete them or cannot complete them to the satisfaction of all parties. In our case, we observed that these problems motivated participants to engage in new performances or trials. The actions they took to resolve problems were related to what they thought the problems were and what they thought would make them go away.

In both narratives, problems with accomplishing the recruitment routine emerged soon after it began to be enacted. The problems associated with the contracting subroutine prevented the hiring process from being completed and new employees from being paid. The problems with the welcoming subroutine made it difficult for the new employees to start to work as effectively as had been envisioned and thus embarrassed LLD's members.

$Trial_1$. Both narratives started with performances that were consistent with the espoused schema. Subsequent trials emerged as responses to problems. In narrative 1, the subsequent trials included using temporary contracts, rewriting employment ads, writing an employee guidebook, hiring a contract coordinator, and reorganizing the contract procedure. Some of these trials took place so close in time that we have treated them as if they were simultaneous and contributing to the same ostensive pattern. In narrative 2, the subsequent trials included developing the new employee form to coordinate the Consortia with the Secretariat and hiring the contract coordinator. Although fewer new actions were tried in relation to the welcoming part of the recruitment routine, we have depicted them as contributing to successive ostensive patterns because they were further apart in time. In both narratives, many specific actions constituted these trials; it would take more space to describe these actions than is available here.

Ostensive patterns. Ostensive patterns of routines are created and recreated through specific actions taken to enact the routines. Performances that are enacted once or twice do not necessarily indicate an ostensive pattern, but performances that are repeated and justified as appropriate do indicate an ostensive pattern. The task (e.g., writing contracts, welcoming people) that is often implicit in an ostensive pattern is evident when people are upset about being unable to either complete the task or complete it satisfactorily. In keeping with the above, ostensive aspects are a matter of interpretation. As discussed in the introduction, there are multiple ostensive aspects because interpretation depends on point of view. Point of view does not necessarily imply individual interpretations, as single individuals can have multiple points of view, and different individuals can have similar points of view. We have focused primarily on the interpretation that was dominant in LLD during the fieldwork and not detailed the many, sometimes conflicting, interpretations that were present. The multiple points of view became more evident in our narratives as the Secretariat and the Consortia began to be more at odds about the meaning of the actions taken in the routine's performance.

In both narratives, new ostensive patterns emerged as trials that resolved problems were adopted. In narrative 1, the first change in action (i.e., using a new kind of contract) was primarily intended to reinforce the imagined ostensive pattern and find a new way of enacting it (via TAP contracts). Later actions diverged from this imagined pattern more extensively and made the routine more traditional and bureaucratic as coordination with DPU and within LLD increased and as negotiating within public sector constraints became part of the enacted routine.

In narrative 2, the changes in the ostensive patterns related both to the increasing coordination between people within LLD and to changes in what it meant to welcome people. Initially, welcoming was primarily about helping people feel connected to others in the workplace, and the specific actions included sending flowers and giving a tour. Over time, specific actions were added that emphasized helping people get to work on projects quickly.

Organizational Schemata

LLD's founding mandate and the founding managers' initial discussions provided the basis for the espoused organizational interpretive schema, which had several features. LLD would be an entrepreneurial research organization that was unlike traditional, bureaucratic research organizations in academia. It would operate in ways that were similar to private sector operations in that its work would be project oriented, have quick turnaround, and be immediately relevant to practice. The founding managers wanted LLD to operate as a family because they believed it would help the organization to produce knowledge in new ways. Broadly speaking, this espoused schema was based on an either-or logic. That is, LLD could be either public or private, either entrepreneurial or traditional.

Yet the enacted schema that emerged was not always consistent with the espoused one, and the integrity of the espoused schema came into question. Indeed, the changes made in performances of the recruitment routine were at odds with other actions in the organization that also constituted the enacted schema, such as the entrepreneurial actions that the Consortia directors and researchers undertook in regard to the projects they were engaged in. Questions emerged over whether the enacted schema was bureaucratic or entrepreneurial, public or private, traditional or familial.

Error$_2$. As the actions taken in recruiting diverged from the espoused schema, they raised questions about this schema's integrity. Error$_2$ denotes such questions. Both narratives suggest LLD members' concerns about whether the lab was enacting its founding schema, in which it was important to be "different," even as the actions it took became increasingly bureaucratic.

Trial$_2$. As discussed above, trial$_2$ denotes actions in response to questions, which are concerns about the organizational schema. As a mode of coordination within LLD, for instance, the ambassador model was a trial of new ways for LLD's members to interact and coordinate that changed the way they performed routines, including the recruitment routine. It came about in response to questions about whether LLD's schema was still that of an alternative entrepreneurial organization after it had become more bureaucratic and traditional. The ambassador model created a way to enact a schema that was simultaneously alternative and bureaucratic, and it allowed LLD to operate in a manner that satisfied both the Consortia and the Secretariat. As a result, it supported the move from the initial espoused schema based on an either-or logic to a new espoused schema based on a both-and logic. In the new espoused schema, LLD would incorporate bureaucratic ways of acting while not losing its unconventional, entrepreneurial orientation.

DISCUSSION

Two connected aspects of our study allow us to show how trial-and-error learning processes as enacted in routines are related to the enactment of an organizational schema. Some empirical studies (Feldman, 2003; Howard-Grenville, 2005; Tucker & Edmondson, 2003) have pointed out the relationship between routines and schemata. Our study extends this work by empirically tracing how trial-and-error learning links these constructs. First, by breaking routines into parts, rather than treating them as entities (Feldman & Pentland, 2003; Pentland & Feldman, 2005; Salvato & Rerup, 2011), we expose the microfoundation of observable action necessary for understanding how routines are tried out (Greve, 2008) and become sources of schema change. Second, by tracing the processes of trial-and-error learning as they relate to the enactment of both routines and organizational schemata, we are able to reveal two different trial-and-error learning processes. In combination, these aspects of our study add to the theoretical precision of the classic Carnegie School approach to trial-and-error-learning (Cyert & March, 1963; March & Simon, 1958; Gavetti et al., 2007; Greve, 2003). They also offer a foundation for investigating three assumptions about trial-and-error learning in the existing literature on organizational learning (Argote, 1999; Argote & Greve, 2007; Baum & Dahlin, 2007; Levitt & March, 1988; Levinthal & March, 1993; March, 1991): (1) errors are largely homogeneous, (2) trials are primarily homogeneous, and (3) heterogeneous errors and trials obstruct learning.

Heterogeneity: Breaking Routines and Trial-and-Error Learning into Parts

Challenging assumption 1: Errors are largely homogeneous. The first assumption is that organizations typically encounter one type of error. The Carnegie School perspective defines an error as the failure of an organization to achieve aspirations (Cyert & March, 1963; Greve, 2003; Miner & Mezias, 1996). Yet, in our findings, different kinds of "errors" were associated with trial-and-error processes in routines and the focal organization's interpretive schema, respectively. Specifically, routines generated problems, and the schema generated questions. Problems were specific to the ability to accomplish the task with which the routine was

associated. For instance, having contracts rejected was a problem for accomplishing the recruitment routine. In the extreme, problems prevented the routine from being completed. When less severe problems occurred, such as new employees showing up without the knowledge of the welcoming team, the routine was completed, but in a way that the participants considered inadequate or embarrassing.

Questions were broader and related to how LLD operated as a whole. Employees asked, for instance, whether it was operating entrepreneurially and as a family and whether such a model was sustainable. These questions reflected the many ways that the espoused schema had been enacted. Further, both enactments of routines and actions taken outside of routines were important to how LLD's employees enacted the espoused schema. Because different types of action contributed to enactments of the organizational schema, questions ($error_2$) were likely to be more diffuse than problems ($error_1$) were, and small changes in action were less likely to resolve them.

Challenging assumption 2: Trials are primarily homogeneous. The second assumption is that organizations typically respond to errors in one way. In work taking the Carnegie School perspective, an organization is said to engage in "nonlocal search" or "exploration" when it encounters an error or problem (Baum & Dahlin, 2007; Cyert & March, 1963; March, 1991; March & Shapira, 1992). However, little is said about the nature of the trials that characterize exploration, although scholars in this tradition have often assumed that a routine as an entity is replaced (Baum & Ingram, 1998).

In contrast, we found that the criteria for successful trials that responded to problems were different from the criteria for successful trials that responded to questions. Trials that resolved problems ($trials_1$) enabled organization members to accomplish a task by completing a sequence of actions or completing it differently. $Trials_1$ were modular and contradicted the notion that whole routines are replaced (e.g., Baum & Ingram, 1998; Kim & Miner, 2007). Indeed, a picture of incremental change emerged from our study (Johnson, 1988). Each trial either replaced a specific performance in the (recruitment) routine with another specific performance or added a new performance to the existing set of performances. In narrative 1, an early attempt to solve the problem of rejected contracts involved using a different kind of contract. Performances were also added to the routine, such as those that occurred after the contract coordinator was hired. In narrative 2, the changes consisted primarily of additions, such as filling out the new employee form.

Trials that resolved questions ($trials_2$), by contrast, enabled organization members to reorient how they conceived of their organization's schema and thus how they acted in both routines and other kinds of actions. $Trials_2$ more closely fit the idea of replacing a routine or, in this case, creating a new routine. The ambassador model, for example, provided a new panoply of actions and interactions that affected how many of LLD's routines were enacted. It also influenced how people interacted in LLD as a whole. Ultimately, it supported the enactment of a new, more complex schema that combined the entrepreneurial and alternative with the bureaucratic and traditional.

Insights generated by challenging assumptions 1 and 2. In challenging these two assumptions, we suggest a new way to understand the role of trial-and-error learning in organizations. Prior explorations of such learning have either focused exclusively on trials that resolve problems or conflated trials associated with problems with those associated with questions (Cyert & March, 1963; Greve, 2003). With few exceptions (Beckman & Haunschild, 1997; Haunschild & Sullivan, 2002; Kim & Miner, 2007; Miner et al., 2001; Rerup, 2006), earlier discussions have largely identified one kind of error and focused on the inability of a routine to achieve an organizational aspiration. They have also largely considered one kind of trial and focused on the replacement of an old routine or creation of a new one. Although organizational aspirations may connote enacted schemata, this measure makes it difficult to consider concerns with an enacted schema as a whole. As a result, past work has often misidentified $error_1$ and often overlooked $error_2$.

Additionally, because the conception of routines as entities implies trial-and-error learning is a single process (Miner et al., 2001: 305), it has obscured how organization members incrementally adjust routines as they engage in trial-and-error learning. As a result, $trial_1$, or how a routine is actually tried out, has been overlooked (Levitt & March, 1988: 320; Greve, 2008: 199). $Trial_2$ (creating new routines) has been identified (Greve, 2003; Miner et al., 2001; Salvato, 2009), but only as a solution to $error_1$ (a problem with routines). Its roles in resolving questions about organizational schema and changing a schema have not been appreciated ($error_2$). By highlighting an extra type of error and an extra type of trial, we show that trial-and-error learning in organizations can be more heterogeneous than prior work has suggested.

Challenging assumption 3: Heterogeneous errors and trials obstruct learning. The third assumption is that organizations cannot learn from heterogeneous errors and trials (Cyert & March, 1963; March & Simon, 1958). A long tradition of work has suggested that it is difficult for people to act in the context of complex information because they are "boundedly rational" (Gavetti et al., 2007) and have cognitive limitations (for a review, see Sutcliffe and Weick [2008]). More recently scholars have started to illustrate how organizations learn and act in the face of complex information (Beckman & Haunschild, 1997; Haunschild & Sullivan, 2002; Kim & Miner, 2007; Miner et al., 2001; Rerup, 2006). We add to this line of work by emphasizing the creativity of action in responding to complexity.

Problems and questions are different in ways that affect the kind of attention they receive and their relationships to action. Problems are likely to be more frequent, highly salient, and immediate because they hinder the ability to accomplish a specific task. When a routine is enacted frequently, the problems associated with that routine may also be frequent. In contrast, questions are more diffuse. Even when they are pervasive, questions may not interrupt or delay the ability to take a certain action or to accomplish a specific task (Repenning & Sterman, 2002). As a result, errors related to problems influence trial-and-error learning differently than do errors related to questions. In LLD, members were more likely to attend first to task-oriented problems (e.g., not being able to get a contract approved or not having workstations ready) than they were to the more amorphous questions that pertained to the schema (e.g., Is our organizational model sustainable?).

Our distinction between problems and questions suggests not only why organizations are more like fire-fighters than they are like strategic decision makers (Cyert & March, 1963), but also that organizations can take actions that allow them to influence whether they operate more like fire-fighters or strategic decision makers. LLD's members developed workable actions through trial-and-error learning within a routine. Some of their actions were consistent with the espoused schema. Others were inconsistent with and a challenge to this schema. Yet both sets of actions helped accomplish different things that these members wanted to accomplish. Rather than assuming that all actions had to be consistent with the initial espoused interpretive schema, LLD's managers strove to make the two kinds of actions work together (using a both-and logic). The ambassador model was a way to keep both sets of actions. A new espoused schema that emphasized the ability to be both alternative and bureaucratic emerged as a way of articulating this enactment. In this way, the managers used the solutions they had devised to fix the routine as input for their strategic actions.

Our findings suggest that heterogeneous trials and errors can create opportunities for engaging in and managing change by enabling people to discover goals that did not occur to them before they started to act (Feldman, 2000; Joas, 1996). When organization members resolve problems within organizational routines, the new actions they take to do so may not be consistent with their organization's espoused schema. As a result, questions about the schema may emerge, and tension may arise between solving specific task-related problems and enacting a schema that makes sense for the organization. Our findings are well aligned with studies showing how experience with heterogeneous errors benefits organizational learning (Beckman & Haunschild, 1997; Haunschild & Sullivan, 2002; Kim & Miner, 2007) by generating constructive conflict between different perspectives, which under some circumstances can lead to better analyses and problem responses (Levinthal & Rerup, 2006; Plambeck & Weber, 2009; Rerup, 2009).

Such creativity may be problematic in certain contexts that require high reliability (Weick, 1988; Weick, Sutcliffe, & Obstfeld, 1999). It may thus be inappropriate to many settings in which trial-and-error learning has been studied, such as airlines (Haunschild & Sullivan, 2002), banking (Kim & Miner, 2007), and some service and manufacturing industries (Beckman & Haunschild, 1997). It may be valuable, however, in situations in which creative action does not compromise vital systems, as in our case, or where disrupting vital systems might lead to better ways of operating (Michel, 2007).

Organizational Schema Change

Our conceptualization of change in organizational interpretive schemata as a process in which the enactment of routines influences the move from espoused to enacted schema extends prior work that emphasizes the importance of enactment (Balogun & Johnson, 2005; Bartunek, 1984; Johnson, 1988; Weick, 1979; Zilber, 2002). Scholars who study schema change have identified a recursive relationship between actions and abstract patterns (Balogun & Johnson, 2004, 2005; Bartunek, 1984; Labianca et al., 2000; Zilber, 2002). This work provides the basis for developing deeper knowledge about how actions influence schemata (Elsbach et al., 2005: 431). Our research shows how organizational routines as generative systems, consisting of

both ostensive patterns and the performances that constitute these patterns, are linked to schema change. We also developed a new conceptualization of the role of trial-and-error learning in schema revision. Our finding that trial-and-error learning processes are heterogeneous enables us to provide stronger and more detailed theory about the role of action in schema change.

Our research contributes to existing work (Balogun & Johnson, 2004; 2005; Labianca et al., 2000) emphasizing that schema change is not a one-off "strategic" event but an ongoing process that requires understanding of the everyday and repeated aspects of organizational behavior (see also Jarzabkowski, 2008; Johnson, Langley, Melin, & Whittington, 2007). In organizations, people try things out, and when these attempts don't work out as expected, they try new things. Our research contributes to this way of understanding change in organizational schemata by focusing on the role of trial-and-error learning as it is provoked by the effort to enact organizational routines. We also build on prior research on the development of organizational schemata highlighting the role of people throughout organizations (Labianca et al., 2000) and the role of middle managers (Balogun & Johnson, 2004). Our research shows how multiple people from different organizations (e.g., LLD and DPU), ranks, departments, and Consortia were involved in the LLD recruiting routine and the enactment of LLD's espoused schema. Specifically, we examined the roles of senior managers (e.g., the managing director and research director), middle managers (e.g., Consortia directors, brokers in the Secretariat), and the broader membership of LLD.

Studies of schema change have often emphasized the contentiousness of the process. Our study provides an opportunity to see how an organization can negotiate this contentiousness through the enactment of task-specific routines and the possibility of a top-down and bottom-up process of schema and routine change. Enactments of bottom-up routines are initiated with a top-down process of espousing a new schema.[3] As routines build that challenge an espoused schema, this disjuncture periodically generates enough bottom-up tension for the espoused schema to be surfaced, discussed, and changed. Our study focuses on the role of trial-and-error learning in the process of schema change and reinforces the emergent nature of the interactions between routine development and schema development. Though both routines and schema may stabilize at some point, our study shows how changes in one can provoke changes in the other.

Scholars studying competing logics at the institutional level of analysis have expressed interest in the development of both-and logics in organizations (Lounsbury, 2007; Thorton & Ocasio, 2008). Our findings show how LLD enacted a schema through trial-and-error learning processes and moved from an espoused either-or schema to an enacted both-and schema. Further research into how trial-and-error learning related to routines and schemata can be structured to invite the kind of broad participation that took place at LLD could explain more about promoting both-and logics in organizations (O'Reilly & Tushman, 2008; Plambeck & Weber, 2009).

Implications for Practice

Change is a central theme in all types of organizations (Corley & Gioia, 2004; Johnson, 1988; Nag et al., 2007). Our study of the role of trial-and-error learning in the coconstruction of an organizational routine and organizational schema has significant implications for managers. The importance of managing organizational values has emerged in applied (Beer, Eisenstat, & Spector, 1990) and academic outlets (Kabanoff, Waldersee, & Cohen, 1995). The assumption underlying "value change programs" is that an organization's interpretive schema can change through intervention at a cognitive level.[4] By focusing on the relationship between routine and schema, we provide evidence of the power of intervening in actions and in how organization members act (Elsbach et al., 2005). We also illustrate the relationship between the mundane and the strategic roles of routines and clarify how routines can provide managers with a tool for managing change.

LLD's move from an either-or to a both-and schema also provides evidence that trial-and-error processes can be a way of negotiating the various tensions and conflicts in organizations undergoing change. Our study shows that the trial-and-error processes can be engaged in differently for different types of organizational structures (e.g., routines and schemata). At LLD, trial-and-error learning produced changes in organizational routines, as shown by our example of the recruiting routine, and these changes in turn provoked engagement in trial-and-error learning at the schema level.

[3] We are grateful to one of our reviewers for helping us articulate this point.

[4] We are again grateful to a reviewer for helping us articulate this point.

Through this process, LLD incorporated the ability to accomplish tasks effectively and maintained much of its original vision of being alternative and different. Researchers have often assumed that support for an old vision or schema needs to be reduced before a new one is instilled (e.g., Gioia & Chittipeddi, 1991; Gioia & Thomas, 1996). Our evidence suggests that organizations can sustain a generative tension between alternative interpretive schemata by developing ways of influencing routines, such as the ambassador model, that incorporate the many different actions that organizational participants have worked out through trial-and-error learning.

Limitations and Implications for Future Research

Our study examines patterns of change in a single organization. Although some have argued that "it is always potentially problematic to argue for extensions from case studies" (Corley & Gioia, 2004: 205), our emphasis on explicating process dynamics rather than specific outcomes mitigates this problem. Indeed, just as the same interactions between parts of a routine can produce stability or change (Feldman & Pentland, 2008), the interactions between routines and organizational interpretive schemata can produce many different outcomes. LLD could have, for instance, entirely abandoned its espoused schema of being cool, alternative, and entrepreneurial for a traditional, bureaucratic way of operating. Such an outcome is frequent for start-up organizations (Perlow, 2003). Our study shows the potential for a dynamic relationship between routines and schemata and suggests that trial-and-error learning is important in that relationship. Having identified the dynamic relationship and the role of trial-and-error processes, however, it is reasonable to wonder about the conditions under which these processes are likely to occur. In the following, we discuss boundary conditions that may influence the dynamics we identify.

That LLD was a new organization may be important. Newness is one likely condition under which the enactment of routines produces significant challenges for the enactment of an espoused organizational interpretive schema. Newness may occur in a variety of forms. For instance, a corporate spin-off often needs to establish a schema that is different from the parent's. Further research could identify the role of newness and other conditions in which the enactment of routines challenges an espoused interpretive schema.

Another boundary condition pertains specifically to the kinds of routines that might produce the dynamics we have identified. The recruitment routine had two features that may be important. First, it had to work for the organization to be functional; LLD could not operate if it did not recruit employees. This is true of many, but not all, organizational routines. Those that are not critical to an organization may have a less pronounced effect on schema enactment. Second, the recruitment routine was frequently executed. Routines that are less frequently performed may have less effect on an enacted schema and may even be inconsistent with an espoused schema without challenging it.

Conclusion

With few exceptions (Feldman, 2003; Howard-Grenville, 2005; Tucker & Edmondson, 2003), research on organizational routines and organizational interpretive schemata has developed independently. In contrast, we have shown how heterogeneous trial-and-error learning bridges these research streams. First, we conceptualized routines as parts. This move let us analyze a microfoundation of observable actions for understanding how routines are tried out. Second, we conceptualized trial-and-error learning as it relates to these parts. This move let us connect actions taken in routines with changes in an organizational schema. In combination, these moves let us (1) identify previously overlooked heterogeneous features of trial-and-error learning and (2) develop a stronger theoretical underpinning for the coevolutionary complexity that exists between familiar higher- and lower-level constructs, such as organizational interpretive schemata and organizational routines. These new ways of understanding familiar constructs provide new tools for understanding how organizational stability and change occur.

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