ISSUES IN EMPIRICAL FIELD STUDIES OF ORGANIZATIONAL ROUTINES[1]

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[1] This paper is an equal collaboration.

INTRODUCTION

In organizational research, the most familiar units of analysis are individuals, groups, establishments and organizations. These units have relatively clear boundaries, which make them observable, distinguishable, comparable and countable. By comparison, organizational routines are difficult to observe, distinguish, compare and count. In this chapter, we draw on our own fieldwork experiences as a basis for reflecting on the problems of studying organizational routines. We make connections to other empirical field studies that have focused on developing an understanding of organizational routines (e.g., Naduzzo, Rocco, and Warglein, 2000). We focus on two very basic issues: identification (White, 1992) and comparison (Ragin, 1987). Identification involves recognizing empirical instances of a routine, the parts as well as the whole. Comparison can be cross-sectional (involving different routines), or longitudinal (involving changes in the same routine over time). Together, identification and comparison form the foundation for all empirical work on routines.

We begin with a "confessional" (Van Maanen, 1988): a behind the scenes look at our own research process on routines. Our experiences and observations, and those of other field researchers, have led us to conceptualize organizational routines as generative systems rather than fixed things (Feldman and Pentland, 2003). With this conceptual framework as a guide, we discuss how identification and comparison apply to organizational routines. Issues such as point of view and concurrency can make identification and comparison particularly problematic when conducting field research on routines. Where appropriate, we draw upon examples of how these issues have been handled in existing empirical field research.

WHAT IS GOING ON HERE?

In published research, one tries to create the impression of rigor and objectivity; a good design, well executed, with little error. Of course, field studies are usually not so clean or clear. To help readers appreciate our view of the issues, each of us will present some of the messy details from our own work.

Pentland's story

If you sit in a cubicle with a software hot line worker for a few hours, you will see them do a lot of different things. They will answer calls, make calls, answer questions, ask questions, look things up, write things down, fill out forms, and more. Once in a while, they may get up to go to a meeting or get a cup of coffee. But how do these activities connect? Is there a thread that ties these discrete actions into productive work?

I chose to study software support hot lines partly as a matter of convenience. It seemed like a very clear cut and well bounded kind of work: calls come in, answers go out. Everything happens in one place, within a fairly short time span. I reasoned that I could get a lot of data in a relatively short amount of time. Better yet, there were lots of software vendors in and around Cambridge, Massachusetts, easily accessible to a graduate student at MIT.

My first disappointment was that the work did not happen all in one place. In the sites I studied, calls were answered by switchboard operators who verified that the caller was entitled to support and then placed the call in a "queue." If I sat with the switchboard operator, as I did for several days at each site, I just observed the first bit. To find out what happened next, I had to follow the call.

Worse yet, was the realization that a great deal of the "work" happens on the other end of the phone. Most problems started long before the caller decided to call for help; by the time they

called, they might have tried several different fixes and workarounds and gathered various kinds of evidence. In other cases, the support person asked the caller to do some investigating, run some tests, gather some information, and send it in before calling back. In any case, it was clear that the work happened in many different places and I could only observe one of them. In other words, the boundaries on this work process were not as clear or localized as I had thought.

It took me quite a while to realize that the boundaries were not same in my two field sites, either. They sites were both "software support hot lines", and the people working there were self-described "support people." These labels were accurate, but they masked important differences. In one site, the hot line staff would answer questions and try to replicate problems, but they did not even have access to the underlying code. If they thought they had a found a bug, they would write it up and submit it to a separate group, housed in a separate building. Due to security precautions at the firm, I was not allowed access to that building. In the other site, the hotline people also answer questions and tried to replicate problems, but they did have access to the software code. They could edit code and create "patches" that customers could use to fix bugs and even extend the basic product. Thus, the range of activities at the two sites was quite different.

Once these issues were clarified, the most challenging problem was how to figure out what happened when problems were not resolved in a single phone call (which they rarely were). Even for a very simple problem, there was often a round of phone tag (customer is at a meeting, out to lunch, etc.) When the support person got the customer on the phone, there was often a delay while the customer got more information or tried a workaround ("reinstall and let me know if you are still having the problem…"). In the meantime, the support person would move on to another call. The follow-up might not happen for a day or two (or longer), and it might not be

handled by the same support person. These constant interruptions, transfers and delays made it almost impossible to observe entire performances from start to finish. I could collect a lot of data, but it was mostly fragments. My analysis of "organizing moves" (Pentland, 1992) and "interpretive moves" (Pentland, 1995) were based on these fragments.

Archival records from the field sites were a big help in dealing with this problem. Each site used a call tracking database where hot line workers were supposed to enter significant steps taken on each problem. These records were less than perfect; they were typed in by busy hot line workers, and were usually just detailed enough to remind themselves what had happened. Still, these databases allowed me to connect distinct actions into a sequential story for each problem, from beginning to end (opening, actions taken, and closing). Without these records, it would have been impossible to examine the sequential structure of the hot line performances (Pentland and Reuter, 1994).

In addition to software support hot lines, I have observed a variety of other occupations: librarians, travel agents, bank investigators, financial auditors, and IRS revenue agents. In each of these cases, the work seemed to involve localized, repetitive, recognizable patterns. As with hotlines, however, it was easy to observe fragments, but hard to get whole performances. The work turns out to be more distributed than it seems at first, and the patterns are only recognizable and repetitive if you know what you are looking for.

Feldman's story

I have engaged in two longitudinal ethnographic field studies of organizational routines. In one I saw the remarkable stability of an organizational routine that many who engaged in it thought made no sense. In the other, which I engaged in to understand this stability, I found change.

My first study took place in the U.S. Department of Energy. In it I asked how the bureaucratic production of information was related to the policy process. Policy analysts spend much of their time writing reports. These reports are usually either required on a regular basis (e.g., an annual review of a program) or as part of a particular policy decision. Regardless of why they are generated, they are seldom read by policy makers and appear to have no discernable relation to policy decisions. The title of the book I wrote, *Order Without Design* (Feldman, 1989), reflects the message that this routine made sense in ways that were not obvious to or created by the people who enacted the routine. My study identified regularity in the abstract pattern of report writing. Identifying this abstract pattern enabled me to connect particular features of the pattern to demands of the policy process. For instance, the concurrence process that was part of the report-writing routine required that a broad set of participants take part in any particular instance of the routine and that requirement ensured that there would be broad dissemination of information across the many organizations that were represented on the concurrence list. I argued that broad dissemination was one of the ways in which the report-writing routine had beneficial consequences for the policy process even though the participants in the routine were not aware of their contribution to these consequences.

I started my next study with the express goal of understanding how it is that you can have routines like the report-writing routine that are not intended by the people who enact them. This question took for granted that organizational routines are stable and inertial. I wanted to know how this stability was achieved. My assumption was that something about how routines operated in organizations encouraged consistent behavior and discouraged flexibility and innovation. Alas, poor Yorick! I had no idea what a journey I was about to take.

I chose an organization, the housing division of a large state university for two reasons. One, it had routines that dealt with the production of rooms and beds and things that are, in themselves, fairly stable. Two, I was assured by several people that the routines in this organizational were mind-numbingly stable.

Unlike the Department of Energy, in this organization the abstract patterns of routines were fairly easy to identify and before long I was happily following five routines that the participants had identified as important to what they do. The five were 1) budgeting for maintenance and renovation of the buildings and operations within the buildings, 2) hiring the student resident staff, 3) training them, 4) moving students into the residence halls in the beginning of the school year and 5) closing the residence halls at the end of the school year. Within each of these routines there were multiple sub-routines, and there was some variance in what was included in each of routines depending on who was describing them. Nonetheless, organizational participants had a good understanding of the rules and actions implied if one were to say, "now we are doing budgeting" or "now we are doing hiring." Each of these routines had an annual cycle, which I followed for 4 years. Over those 4 years, 4 of the routines changed quite markedly. The one routine that changed only minimally was the budget routine. Ironically, it was the one that the supervisors in the organization wanted to change (Feldman, 2003).

It took me a long time to realize that what I needed to understand and explain was change. It took an even longer time for me to convince editors and reviewers. One of the difficulties was explaining what it was that was changing. At some level each of the routines stayed the same. Residence advisors applied for jobs, were screened, interviewed and hired.

Parents brought their children to the university and moved them and their belongings into the residence halls.

Yet, in so many other ways the routines had changed. The routines changed in the tasks that were undertaken to enact the routine changed, what one might call a change in scope. For the moving-in routine, the organization engaged in activities it had never undertaken before. They re-routed traffic, scheduled move-in times, made volunteers available to transport goods and set up a designated space for solicitors. For the hiring routine, the same actions were undertaken, but by different units in the organization. Rather than having the initial screening take place at each of the residence halls, it was centralized. The effect was quite substantial (Feldman, 2004).

Finally, one routine changed not just in the tasks that were undertaken or by whom but also in the meaning of the task itself, a change in signification. Damage assessment, part of the process of moving people out of the residence halls at the end of the year, had always been successful as a way of compensating the university for damage, but some thought it should also be a way of educating the students who caused the damage about the consequences of their actions. The routine was changed to accomplish this goal over the course of the 4 years of my observation (Feldman, 2000).

The housing study unlike the Department of Energy study forced me to focus on the different ways to identify an organizational routine. For the Department of Energy study I compared report-writing incidents in order to abstract the pattern. I used that pattern for the subsequent analyses. Because the focus of the housing study was always the internal dynamics of routines, the abstract patterns were the starting point and I compared the same routines over time. This strategy highlighted the performative aspect of routines and on the difference that

people and their performances in routines make. The first publication from this research identified ostensive and performative ways of identifying routines, but associated them with etic and emic approaches to research, respectively (Feldman, 2000).

Our story

One theme that emerges from our field research is that if you look closely, routines can be surprising. Pentland looked for repetition and found variety. Feldman looked for stability and found change. For the last several years, we have been working together to develop concepts and vocabulary to describe and explain the range of phenomena we (and others) have observed. All along, we have felt that in spite of their obvious importance, organizational routines had been taken for granted and objectified. In response to this concern, we articulated the difference between ostensive and performative aspects of organizational routines as a means of explaining the enormous variation we observe, from great stability to tremendous change (Feldman and Pentland 2003). In that paper, we did not talk much about artifacts, and the distinction between ostensive and artifact made only a cameo appearance.

We have subsequently realized that we needed to distinguish the ostensive aspect of a routine from physical artifacts such as standard operating procedures, forms, computer systems and so forth (Pentland and Feldman, 2005). We continue that effort in the present chapter as part of our on-going effort to understand and operationalize the ostensive. We sometimes conceptualize the ostensive as narrative -- a story or stories about how work gets done (Feldman and Pentland, in press). These stories imply *connections* between actors, actions and artifacts that enable us to recognize and reproduce the performances. Our understanding of this complex phenomenon continues to evolve through empirical study and our research conversation. The

following discussion summarizes where we are to date and explores some of the research issues as they have emerged in our own and other people's field studies.

CONCEPTUALIZING ORGANIZATIONAL ROUTINES

Organizational routines are best conceptualized as generative systems that can produce a wide variety of performances depending on the circumstances. Figure 1 illustrates a simple way of visualizing the parts of an organizational routine. On one hand, routines consist of abstract, cognitive regularities and expectations that enable participants to guide, account for, and refer to specific performances of a routine. We refer to this as the "ostensive" aspect (Feldman and Pentland 2003). On the other hand, routines consist of actual performances by specific people, at specific times, in specific places. We refer to this as the "performative" aspect (Feldman and Pentland 2003). These two aspects are mutually constitutive; without these two aspects, a routine cannot exist.

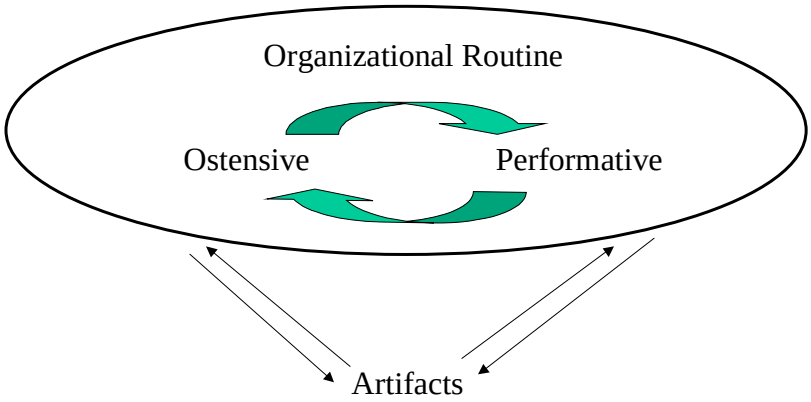

Figure 1: Organizational routines are generative systems

In any practical setting, these aspects of an organizational routine may be enabled and constrained, by various artifacts. Artifacts take many different forms, from written rules, procedures and forms to the general physical setting (e.g., a factory or an office). We call attention to artifacts here because they have been particularly prominent as a means of collecting data about routines. Artifacts such as rules and written procedures can serve as a proxy for the ostensive aspect of a routine. Artifacts such as work logs and databases can also provide a convenient archival trace of the performative aspect (Pentland and Reuter, 1994). Artifacts can be "enrolled" in the performance of a routine to varying degrees, at the discretion of the participants (Feldman and Pentland, in press).

These aspects are distributed in time and space; different participants perform different parts of a routine. This simple fact forces us to choose a particular point of view when studying routines, because we cannot see the whole thing. Indeed, it is difficult to identify what a "whole" routine is, an issue we explore in more detail below. In field studies of routines, point of view has a simple, basic sense of "where one stands" while observing. For example, does one sit with the switch board operator? What if one cannot visit some parts of an organization where a routine is carried out? It also has a deeper sense of whether one adopts an etic or emic perspective (Headland, 1990). We use these concepts here to help clarify the ostensive and performative aspects of routines, and we return to them in more depth later.

Examining performances

Performances are the visible, repetitive part of a routine. Even so, performances are hard to see because, as Pentland discovered, they are usually distributed over time and space. Some events are visible and others are hidden from any particular point of view, and the boundaries are

not given or self-evident. Thus, while a routine may generate a sequence of events, the particular events and sequences we observe are partly a result of our point of view on a process (Pentland, 1999a). Point of view is equally important when considering the meaning of a performance: even though a customer and a service provider may agree on "what happened" in a service interaction, they may have entirely divergent perspectives on its quality or acceptability.

When observing the performative aspect of a routine, researchers often choose a coding scheme to represent the observations. Point of view is obviously critical here. Unlike things, that usually have well-defined boundaries, events must be constructed and "unitized" out of a stream of observation (Folger, Hewes, and Poole, 1984). In principle, actions can be broken down into arbitrarily fine-grained detail (Abell, 1987). In practice, much larger chunks are often more meaningful (Malone et al, 1999). Even if one is working inductively and defining codes based on participant categories, there is likely to be considerable discretion as to the number of codes actually used. For example, Sabherwal and Robey (1993) report that they started out with 25 codes, but found that it was difficult to distinguish them reliably. As a result, they reduced their lexicon to 15 codes. The specific coding scheme is a matter of researcher choice and judgment and reflects a basic choice between etic and emic perspectives.

Examining the ostensive

The ostensive aspect of organizational routines is also distributed. It is distributed in two distinct, important ways. First, different people may understand different parts of the routine (e.g., a product development routine typically involves design, marketing, manufacturing and finance). Second, different people may have different, conflicting ideas about how a routine should be or is performed. While at times there may be a "truce" (Nelson and Winter, 1982), both explicit and implicit conflict may often characterize the ostensive aspect of organizational

routines. Thus, any particular rendering of the ostensive aspect of a routine is potentially contested.

Unlike performances, the ostensive is not directly visible. The ostensive aspect can be thought of as a narrative about the routine, but the narrative need be neither coherent nor consensual. In addition, much of the ostensive aspect may be tacit assumptions that must be true in order for the rest of the narrative to make sense. In any case, it seems clear that in most cases there is no singular, unified ostensive aspect of the routine that can be recovered. Instead, the ostensive aspect is more likely to be a collection of partial, overlapping narratives.

This poses challenges for the researcher who wants to pinpoint the ostensive aspect of a routine. Imagine trying to collect the story of "little red riding hood" (or “writing a policy statement”) by interviewing each character about their role. One would get a different story from the point of view of each character, but they might not be able to explain how their parts fit together. At the same time, participants need to have *some* understanding of the ostensive aspect of the routine in order to see their actions as part of the routine. The challenge here is finding the thread – the narrative connection – that allows us to identify actions as part of a whole and to identify a diverse set of activities as a coherent flow.

One can cope with this potential variability in the ostensive aspect of a routine by suppressing it. The researcher creates a clear definition of the routine from an outsider’s (etic, objective) point of view. This definition may draw on theory, artifacts, interviews or intuition, but the multiple and conflicting interpretations of the participants are not relevant. The primary pitfall of this approach is our tendency to mistake the definition for the routine (or the map for the terrain). Just because one defines something as the hiring routine, for instance, does not mean that this is the way hiring is accomplished.

Examining artifacts

The main issue in examining artifacts is our tendency to mistake the artifact for the whole routine or for the ostensive aspect of the routine. We have encountered this confusion quite often in discussing and presenting the distinction between ostensive and performative: people tend to lump physical artifacts such as checklists and written procedures in with the ostensive aspect of routines. This is a mistake. Consider a simple example (familiar to many readers, we suspect), where a service establishment posts a sign that says, "The customer is always right." When challenged, employees will usually dismiss the sign as irrelevant to the particular case. The point here is simple: the sign is a physical artifact that does not govern or determine the flow of the service interaction. Suchman's research in which she video-taped secretaries "following" a filing standard operating procedure also makes this point (1983). She showed not only that there were many times when the performances deviated from the standard operating procedure in even this simple routine but also that this happened because there was a logic to the filing routine that was not stated by the standard operating procedure. This logic guided the actions of the secretaries as they deviated from the written procedure.

Our separation of artifact and understanding is consistent with Weber (1968, p. 7), who states that "every artifact … can be understood only in terms of the meaning which its production and use have had or were intended to have …Without reference to this meaning such an object remains wholly unintelligible." Weber clearly distinguished artifacts from the meaning they have for participants, and that is the distinction we are recommending here.

Artifacts can reflect either the ostensive aspect of a routine (as in the case of a written procedure) or the performative aspect of a routine (as in the case of a transaction history or tracking database). At best, artifacts should be treated as indicators of the underlying ostensive

or performative aspect. Participants have their own understandings of the artifact, and they have their own strategic reasons for enrolling a particular artifact (or not enrolling it) in their projects. We cannot discern the significance of an artifact by inspecting it from our own (etic) point of view.

IDENTIFICATION AND COMPARISON OF ROUTINES

Because they are generative systems, distributed in time and space, and enacted by multiple participants, organizational routines are a challenging phenomenon to study. The complexity of organizational routines as a phenomenon requires us to take special care with respect to basic methodological issues that can be more safely skipped with other, more concrete units of analysis. We will focus in on two key questions that emerge, implicitly or explicitly, in any kind of empirical research: identification and comparison. These issues concern identifying the boundaries of the phenomenon, and establishing a way to compare one instance to another.

Identification

For most kinds of empirical research, the first concern is confirming the existence of the phenomenon or entity being investigated. We refer to this as "identification." As White explains (1992, p. 88), "Identity is … the equation of distinct concrete instances as being truly equivalent." In chemistry, for example, one typically identifies ("isolates") a particular chemical or compound in order to study its properties and its role in chemical reactions. In social science, it is equally important to establish the identity and boundaries of our units of analysis (Abbott, 1995). Yet as White argues, boundaries are easily taken for granted:

> Choice of the kind of partition, as well as of particular boundaries, is all too easily taken for granted. Yet the aptness of measurement and modeling schemes, and thus proper training in methodology, will depend on this choice. We may obsess

about numerical details of sampling and miss how important is the initial and perhaps unspoken split (1992, p. 83).

For some aspects of organizational behavior or organization theory, identification seems to pose no problem. At the individual level, we can easily identify and name specific individuals as the units of analysis. Our commonsense perception of the category "person" makes identification appear trivial. In particular, it makes counting easy, but does not resolve questions about what it means to be a particular individual in a particular organization. There is an interpretive dimension to individual identity that is not easily reduced to numbers (Gergen, 1999; Rabinow and Sullivan, 1979; Taylor, 1971).

At the organization level efforts to identify specific forms as the units of analysis is similar though more problematic (Czarniawska, 1997). Problems arise, for instance, when attempting to define organizational "births" and "deaths" (Kaufman, 1976). In this case, the spatial boundary may be relatively clear, but the temporal boundary is not. Indeed, it is remarkably difficult to identify the boundaries of most kinds of complex social structures, such as social networks (Wasserman and Faust, 1994), or professions (Abbott, 1995). Our tendency to anthropomorphize organizations and other structures in everyday language helps produce a sense of concreteness and objectivity that spills over into our research methods.

Our experiences lead us to believe that, in the case of organizational routines, this sense of concreteness is particularly misleading. As we have noted, it is a mistake to equate artifacts with routines, even when the artifacts purpose to represent the routine (Suchman, 1995). It is difficult to see entire performances and difficult to locate the boundaries that separate one routine from another. And of course, performances can display a lot of variability (Pentland and Reuter, 1994).

These features pose significant problems for identification (and also comparison). Using simulated data, Pentland (2003a) demonstrated that even small levels of random variation can mask the presence of two or more fixed patterns in a sample of sequences. Even with complete observations, a large sample of performances, and sophisticated mathematical tools (e.g., optimal string matching), it can be hard to tell if you are looking at one routine or two (or more). In real fieldwork, one is more likely to have only fragments of performances and a modest sample size. How can one identify particular routines?

Ironically, identification always starts with the *ostensive* aspect of a routine. For any kind of routine, the ostensive aspect is needed to answer the question: "What kind of routine is this?" The ostensive aspect provides the abstract idea that allows participants and researchers alike to recognize[2] particular actions as part of a coherent whole; it allows us to recognize patterns (and deviations). It allows us to interpret the significance of particular artifacts that may relate to a particular routine. Ostensive aspects that have been used in empirical research include model changeovers (Alder et al, 1999), doing heart surgery (Edmondson et al, 2001), hiring, training and budgeting (Feldman 2000, 2003, 2004), navigating (Hutchins, 1991), selling insurance and serving fast food (Leidner, 1993), doing a job (Miner, 1990, 1991), fixing air conditioners (Narduzzo, 1998), trouble fixing and building a station (Narduzzo et al, 2000), software support (Pentland and Reuter, 1994) and converting a bank (Szulanski, 2001).

All of these routines involve actions that could be part of many different routines. The meetings, conversations, memos, phone calls could often be classified as being part of a number of different projects or routines. Even actions that take place only in a specific domain such as

[2] The ostensive aspect also allows us to misrecognize (Latour, 1986).

the anesthesiology associated with heart surgery could be associated with many different medical procedures. Participants and researchers, nonetheless, identify specific routines as taking place.

Researchers appear to use two approaches to constructing the ostensive aspect of the routine. One approach is to identify the intended (or at least publicly intended) outcomes. The hiring routine is identified as a set of behaviors and the related narrative about the behaviors that one engages in when one wants to (or wants to appear to want to) hire someone. Budgeting routines are similarly defined by the intention to produce a budget. This approach privileges the emic perspective of the people engaging in the routine. The routine is defined by what their answer might be if they were asked "what are you doing now?"

Another approach to identifying the ostensive aspect focuses on particular events or actions. Different kinds of heart surgery are identified by whether the breastplate is broken or not (Edmondson et al, 2001). Pentland and Rueter (1994) identified their routines by the call the customer made to the hotline. The call begins the routine, the moves that are taken in response to the call constitute the middle of the routine and the routine ends with a determination that the call is closed. While the intentions of the participants are clearly important to the execution of these routines, it is less important to the identification.

These two forms of identification exemplify the etic and emic approaches to research. Researchers taking an etic approach can make assessments that are independent of the assessments of the participants in the routines. A researcher might choose to explore an abstract, theory-driven category, such as "strategy formation" (Van de Ven, 1992). These categories may or may not correspond to the labels or understandings of the participants, yet they are important theoretically. Thus, the researcher identifies the routine (or process) based on their own, theory-driven criteria.

Researchers taking an emic approach require the perspective of participants to identify intentions and understandings. The emic perspective focuses on ways in which routines are defined and energized by the subjective understanding of the participants. Because participants have different roles and different reasons for participating in a routine, they may have very different interpretations of what is (or should be) going on. Given this potential diversity of meaning, identifying the ostensive aspect of a routine involves two interpretive moves: first there are the interpretations of the multiple participants, and then there is the interpretation the researcher makes of these interpretations.

An emic approach enables the researcher to explore variation across participants more readily than an etic approach. This tends to support a view of organizational routines as ambiguous and variable rather than clearly defined and static. An etic approach can be used to impose boundaries on this shifting phenomenon. While this imposition of boundaries can artificially reduce ambiguity and variety, it can also allow researchers to identify patterns where there is enough ambiguity and variety that the participants do not see the patterns (e.g., Pentland and Rueter, 1994). Whether one adopts an etic or emic perspective, the creation of boundaries is what makes comparisons possible, because it creates identifiable units that can be compared.

Comparison

Distinguishing among routines and their performances leads to the second essential ingredient for empirical research, which is the ability to make comparisons. As Ragin (1987, p.1) states, "Virtually all empirical social research involves comparison of some sort." Comparisons are critical to both cross-sectional (synchronic) and longitudinal (diachronic) studies, as described by Barley (1990). In a synchronic analysis, one makes comparisons at one point in time. One can compare different kinds of routines with one another. Are some routines

more stable or changeable than others? Do some routines encourage more learning than others? Are some routines more effective? Darr, Argote and Epple (1995) make synchronic comparisons in their study of pizza restaurants. In a diachronic analysis, one makes comparisons over time. How did participants in a particular routine respond when new technology was introduced (Barley, 1986; Orlikowski, 2000)? How does a routine at time 1 compare with a routine at time 2 and how do we understand the similarities and differences (Feldman, 2000)?

Cross-sectional studies can include both ostensive and performative definitions of routine, but the observation of performance is limited to short periods of time. The opportunity this form of research offers to compare one setting with another also brings with it a tendency to generalize rather than to focus on specific and situated performances. Studies of this sort have produced findings of variability at one point in time (synchronic variety) (Pentland and Rueter, 1994; Suchman, 1983), but because they do not include observations over time, it cannot produce findings of variability over time (diachronic variety). In addition because this method requires on site observation of people doing work, it is relatively costly in terms of access to data and data collection.

Longitudinal field studies are the most likely to encompass a performative as well as an ostensive perspective on routines. Because these studies involve a lengthy commitment to study one setting and the actions of the people in that setting, they confront the researcher with evidence of the impact of the mutual relationship between these aspects of routines. As a result, these studies have the potential to be the most complete with respect to change. It can also show both synchronic and diachronic variety (Barley, 1990; Burgelman, 1994; Feldman, 2000, 2003, 2004; Hutchins, 1991; Miner, 1990, 1991; Miner and Estler, 1985; Orr, 1996). It is, however,

expensive in terms of access to data and data gathering and observations are limited to one or a few sites.

Comparison can occur on any aspect of a routine: ostensive or performative. It can also be accomplished with artifacts. Table 1 shows that comparisons tend to be ostensive to ostensive, performative to performative and artifact to artifact. Leidner's study exemplifies the ostensive to ostensive comparison. While she observes the fast-food serving and insurance selling routines, she does not so much compare them with each other as she compares them with some ideas, namely individuals as cogs in a machine and individuals as agents. Adler et al, fall in both the performative to performative and the ostensive to ostensive category. They compare the 1993 and 1995 Nummi model changeovers, and also at the more abstract level they compare Big-3 model changeovers with Nummi model changeovers (1999). Many studies represent the performative to performative comparison. Miner (1991) and Miner and Rura-Polly (2000) with their emphasis on formalized job descriptions represent the artifact to artifact comparison.

Table X
Comparison of Routines

	Ostensive	Performative	Artifact
Ostensive	Adler et al, 1999 Feldman 2003 Leidner	Feldman 2003 Pentland 2003b	
Performative		Adler et al, 1999 Edmondson et al, 2001 Feldman 2000, 2004 Hutchins, 1991 Naduzzo 1998 Pentland and Rueter 1994	
Artifact		Naduzzo et al, 2000 Suchman, 1983	Miner, 1991 Rura-Polly and

			Miner, 2000 March et al, 2000

Comparisons within a single cell are most common, but there are a few examples of off-diagonal comparisons. For example, Feldman (2003) compares the ostensive aspect of the budgeting routine from the supervisors' perspectives to the subordinates performances. Another off-diagonal is the artifact to performance comparison. Suchman uses this comparison and describes the artifact as a template that guides without determining behavior (1983). Narduzzo shows how the creation of artifacts helps to stabilize performances and institutionalize routines (1998).

Off-diagonal comparisons are interesting because they suggest they enable us to explore divergence between different aspects of a routine. As we begin to explore these divergences, we can ask new questions about the internal structure and dynamics of routines. For example, under what circumstances do changes in the ostensive or in artifacts lead to predictable changes in performances? Or perhaps more interesting, when are performances resistant to efforts to change the routine as a whole?

Point of view and concurrent activities

The difficulty of identifying and comparing organizational routines is compounded by the participation of multiple individuals, as well as the researcher, each of whom may have a different point of view on the routine. By selecting a particular point of view, we insure that our observations will take the form of a temporally organized sequence of events. Point of view is especially important because, in a typical routine, many events may occur in parallel. In an assembly line, for example, all of the workstations are active more or less simultaneously. While assembly lines are a canonical example of routinized work, our ability to "see" the sequence of

actions depends on adopting the point of view of the work-in-process moving from one workstation to the next. If we observed a single workstation, we would probably see only a single event, repeated over and over. The overall sequence would be invisible. And of course, routines can be experienced and described quite differently by different individuals.

In any real organizational routine, it is likely that there are many activities occurring more or less concurrently. For example, in a full-service restaurant, there are people cooking, serving, arriving, eating, paying, and cleaning up more or less all the time. By adopting the point of view of a patron, or cook, or a server, or perhaps a plate of food, we can linearize these activities into a discernable sequence. But any particular point of view is only a partial representation of the true scope and complexity of the routine, because it tends to reduce the pattern of activities into a linear sequence.

As Van de Ven (1992) notes, real processes can branch and recombine. If we attempt to draw a graph (such as a flow chart or an action network) that maps a process, simple linear sequences are probably not sufficient. A more complete representation would require a graph that allows branching and parallel activities. Pentland (1999b) describes the use of basic graph theoretic techniques (Wasserman and Faust, 1994) to represent an organizational routine as a "network of actions." To represent a routine in this way, each action or event in the routine is a node in the graph. The nodes can be related by various kinds of relationships, such as temporal sequence, flows of materials or information, and so on. In graph theoretic terms, all nodes in a linear sequence have in-degree and out-degree equal to one: one action follows after another, one at a time. To represent routines with concurrent activities, at least some nodes need to have out-degree greater than one (splitting into parallel paths) and in-degree greater than one (recombining into a single path). A full-service restaurant makes a good example. When a

waiter takes the order from a table to the kitchen, that order may include salad, entrees, side-dishes, beverages, and so on, each of which can initiate a separate (but more or less concurrent) stream of activity. Then, when the order is delivered back to the customers, it is recombined. Any practical process mapping technique, such as flow charts, data flow diagrams, or Petri nets, allows for this kind of parallelism.

When mapping processes, it is easy to forget that the map typically does not represent the actual execution of the process or the routine (Suchman, 1995). At best, process maps are idealized artifacts. Any particular performance may diverge considerably from this ideal as the participants improvise and accommodate the details of their situation. Thus, for a given routine, each performance may generate a somewhat different graph – complete with branches, combinations, dead-ends, repetitions, temporal gaps, and so on. Pentland (1999b) suggests techniques for summarizing and comparing such graphs. The point here is simply that comparing performances that involve concurrent activities is a not a trivial matter.

Concurrency poses a further challenge, because in many organizational settings, there may be more than one of these patterns actively being executed at the same time (a waiter often serves more than one table at a time; a cook may be preparing several meals more or less at the same time). Thus, when the waiter goes to the kitchen to pick up a salad for one table, he may also pick up the desert for another table. What may seem to be one action (going to the kitchen to pick up an order) is actually two actions in two active performances. Pentland (1992) observed the same thing in software support hot lines, where individual support engineers could have as many as 60 open calls in their queue at one time. Identifying a solution for one customer may solve a similar problem for other customers. Such concurrency is an every day event in most organizations. Hiring routines overlap with training routines or with budgeting routines.

This kind of overlap of activities poses no problem for our ostensive understanding of the routine ("we close the call when we solve the problem" or "we pick up orders and bring them to the tables"). But it can have a big impact on the performances themselves if participants are carrying out more than one performance at the same time. In the software support case, for example, one occasionally observes ten old calls that are suddenly closed without any apparent effort. The performances are, in effect, short-circuited because they are concurrent and interdependent. These kinds of considerations lead us to emphasize the importance of studying the ostensive and performative aspects of routines carefully and, to some extent, independently.

CONCLUSION

Field studies complicate our understandings of organizational routines because they confront us with the messiness of the complex real world. This messiness is both the strength and the weakness of field studies. As our confessional stories that we began this paper with show, the messiness of the real world poses many challenges for the identification and comparison of organizational routines. At the same time this complexity forces field researchers to confront the inadequacies of any system of concepts and to develop new concepts that allow us to see new things. This process opens up new worlds of both understandings and questions.

Much current fieldwork has taken up questions of stability and change in organizational routines. We are just beginning to examine the internal structure and dynamics of routines: the interaction between ostensive, performative and related artifacts. While these internal structures pose some challenging problems for field researchers, they also move us to the next level. They allow us to open up the black box of organizational routines and look inside to examine how this ubiquitous organizational phenomenon operates.

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