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Depicting What Really Matters: Using Episodes to Study Latent Phenomenon

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Depicting What Really Matters: Using Episodes to Study Latent Phenomenon

Décrire ce qui importe vraiment : utiliser les épisodes pour étudier les phénomènes latents

Completed Research Paper

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Abstract

Research on processes and practices around information systems is often best conducted in naturalistic setting. To conduct valid and reliable research in such settings, researchers must find ways to reliably bound the phenomenon in which they are interested. In this paper we propose that researchers use episodes—events or processes occurring over a specified period of time—to isolate that which interests them from the vast set of related human behavior. The paper discusses the nature of episodes in the literature and suggests particular research settings in which episodes can be useful. The paper describes a three stage methodology to identify episodes for systematic data collection and analysis. The paper presents an example study using episodes to study group learning process in distributed groups.

Keywords: Research method, unit of analysis, episodes, virtual work, group learning process

Résumé

Dans cet article, nous constatons que les chercheurs utilisent des épisodes, événements ou processus se produisant sur une période de temps spécifique, pour isoler ce qui leur intéresse à partir de l'ensemble des comportements humains. L'article décrit une méthodologie en trois étapes afin d'identifier des épisodes pour collecter et analyser systématiquement des données. L'article présente un exemple d'étude utilisant des épisodes pour examiner le processus d'apprentissage collectif dans les groupes dispersés.

Introduction

Information Systems (IS) researchers study processes and practices relating to the use, development, deployment, and impacts of information systems in groups and organizations. To best understand the nature of these often latent processes and practices, it is often useful to study the phenomenon in a natural setting, observing them within the setting of normal human behavior and endeavors, using methods that often open us up to a vast amount of data about the phenomenon. In some cases, the intent of the researcher is to embrace the full complexities of life. More often, though, the researcher has a more specific set of research questions that requires focusing on particular aspects of the situation, observing and comparing repeated instances of the same kind of process or practice. To ensure validity in such studies it is necessary to somehow bound what we are investigating in reliable ways (Miles and Huberman 1994; Punch 1998; Yin 1994). As Miles and Huberman (1994) caution, "the looser the initial design, the less selective the collection of data, everything looks important at the outset to someone waiting for the key constructs or regularities to emerge from the site, and that wait can be a long one" (Miles and Huberman 1984, pg 28).

In this paper, we suggest that a useful way to bound and identify latent and embedded IS phenomenon, while still retaining the richness of processes and practices, is to use episodes as a unit of analysis. "Episodes" here are defined as *events, processes and practices that occur over time and have a beginning and an end*. Episodes contain the behaviors that lead to particular outcomes of interest to the researcher. Our suggestion is not novel—Miles and Huberman (1994) suggest episodes or similar bounding of phenomenon—but there has been little in the research literature, and information systems literature in particular, about how to use episodes in a methodical way that increases the validity and reliability of research. The goal of this paper is to discuss the nature of episodes and contribute to the IS literature by providing a guide to how to operationalize and systematically identify and analyze episodes. We will review other studies that have used episodes and will conclude by identifying a number of study areas that could benefit from the use of episodes as a unit of analysis.

The Nature of Episodes

We start by discussing the nature of episodes as a unit of analysis before turning to the question of how they might be reliably operationalized. The goal of defining a unit of analysis for a study is to be able to identify multiple instances of the same kind of thing that can then be compared. In a survey, a typical unit of analysis is the respondent, who can be compared to other respondents (respondents might also be asked to provide information about groups or organizations of which they are members, which can then be compared to other groups or organizations). We require that all respondents be in some ways comparable (all members of a particular population for example), but different in ways that are informative to a research question (e.g., in background, preferences, attitudes or beliefs). However, when examining processes and practices of work, establishing what is comparable becomes considerably more difficult. In some cases, researchers eschew explicit comparisons, preferring instead to treat the setting holistically, using a case study approach for example. In other cases, researchers artificially isolate the phenomenon by arranging to have it performed in a controlled setting. For example, in a lab experiment, each task performed by a subject might be taken as a unit of analysis. A key advantage of such control is the ability to ensure that each task performance is comparable. Essentially, each performance of the task is an episode of the behavior, with the beginning and ending of the experiment bounding a set of actions performed by the subject.

While holistic case studies and lab experiments are useful approaches, studying information systems-related practices and processes often requires that we observe specific phenomena, but in a real setting, nested within a range of other human behaviors. To focus the researchers' attention on the concepts in question, and make the data

collection and analysis feasible, valid and reliable, Miles and Huberman (1984; 1994) and Yin (1994) suggest the researcher bound the phenomenon temporally, using what Miles and Huberman (1984; 1994) refer to as episodes. In his work on case studies, Yin (1984; 1994) similarly suggests that in certain instances researchers focus on events (e.g., processes, programs, decisions or organizational change). Miles and Huberman (1994) defined episodes as "events or processes occurring over a specified period" (p. 26). From the stream of events observed, the researcher identifies multiple episodes of the phenomenon of interest, each with a beginning, middle and end. Focusing the analysis on behaviors bound in time maximizes the researchers' ability to reliably identify instances of the relevant phenomenon, which is particularly important when studying phenomena embedded in human interaction such as on-going processes, practices, and change .

As examples of the use of episodes, Miles and Huberman (1994) refer to early studies in psychology (presented in Giorgi 1975) and Yin (1994), to early studies in sociology and political science (presented in Feagin et al.; 1991) that temporally defined phenomenon in order to better study complex human behavior. To give an example from the information systems setting, a researcher interested in socialization practices in information-technology supported virtual groups might define episodes that focus the researcher's attention on social behaviors connected to new members of the organizations and, specifically, in behavioral change of the individual being socialized. The unit of analysis then becomes episodes of new member socialization. The beginning of an episode would be an event that provides an opportunity for socialization and a typical ending when the new member demonstrates an understanding of new norms or behaves in accordance to the norms. Identifying multiple examples of such socialization episodes allows systematic comparison of their occurrence, nature, antecedents and consequences. Episodes thus allow the researcher to capture instances of the socialization process holistically including the beginning, middle and end and then compare instances of the same process across multiple episodes systematically.

Operationalizing Episodes

In this section, we turn to the question of how to operationalize a study using episodes as a unit of analysis. As we have noted, Miles and Huberman (1994) and Yin (1994; 1984) have both argued for the use of episodes to enhance the validity and reliability of research conducted on naturalistic settings. However, these scholars offer little guidance or example of how researchers can systematically identify the boundaries of an episode and use this unit to collect and analyze temporal events to meaningfully capture and illuminate our understanding of constructs in question. Researchers in IS have similarly used temporally-bounded events such as episodes in their research, but generally without explicitly describing how to operationalize their episodes or explicitly stating how they analyzed and compared across these episodes (e.g., Davidson 2002; Newman and Robey 1992). The contribution of this paper is a more specific description of a method to identify and operationalize episodes in a systematic way. We do so by developing a three-stage approach to identifying and analyzing episodes.

To use episodes as a unit of analysis, a researcher must first create an explicit definition of and coding schemes for the various elements of the episode. A first question is to determine the raw data that will comprise the episodes. Episodes can be identified from many sources, such as particular activities performed by members of a group, messages sent, process steps executed, etc. A key characteristic of these data though is that they represent natural activity over time in which the phenomenon of interest is embedded. To organize the analysis of episodes, we describe the structure of an episode using an input, process, output model (see figure 1). An episode begins with an input, which we call a trigger, that is, an initial event that stimulates or reveals an opportunity for the episode to take place. This initial event will put in motion a serious of activities that determine the course of episode. The activities following the episode trigger are the processes element of the episode. The last element of an episode is the set of outcomes that the process leads to. For example, the effect or outcome of episode is often change, e.g., in organizational culture or group learning, reaching a resolution or a decision in the episode.

The second stage to our approach is content analysis of the raw data to identify episodes by identifying and coding for the elements identified in the first stage. In this way we isolate the behaviors that make up the episode from within the range of behaviors present in the naturalistic setting. One decision in developing such a system is developing rules for partial elements. While we have presented episodes as having all three elements, some episodes may be partial. An apparent episode trigger may not initiate a process, or the process may not lead to the expected kind of outcome. To return to the example of socialization episodes discussed above, it may be that an event triggers an attempt at socialization, but that the newcomer's understanding or behavior is not modified. These partial episodes might be discarded or retained, depending on the research questions. In some instances it might be just as

important to study why such opportunities were not taken advantage of, like in the case of triggers for learning we will discuss in the following section. Lastly, the third stage of coding is to develop a systematic way to analyze the episodes captured in stage two to better understand the phenomenon in question according to the theoretical constructs of interest.

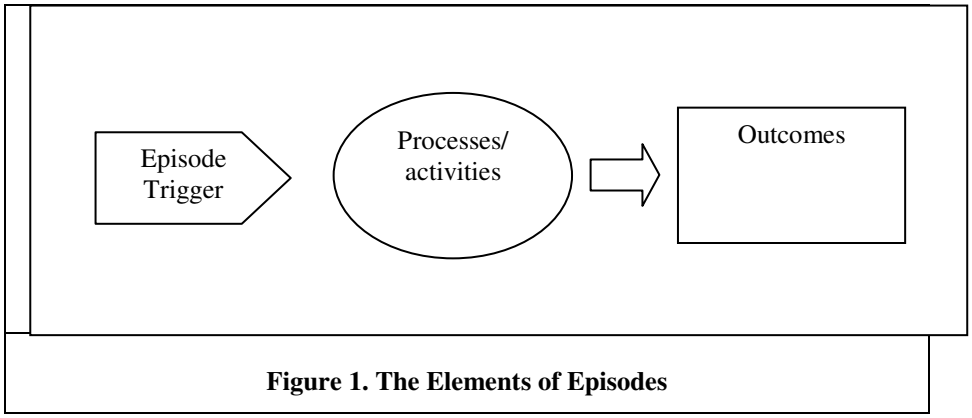

Figure 1. The Elements of Episodes

An Example: Episodes for Studying Group Learning Process

In this section we provide a detailed example using our method to analyze episodes to study a latent phenomena, drawn from a real (though as yet unpublished) study (Annabi 2005). In this example, the phenomenon of interest was team learning. Learning is central to human activity. However, like most human behavior, the concept of learning is broad and abstract, making it difficult to separate from the context within which it is manifested. To understand the complex and embedded phenomenon of learning in general, and group learning process in Open Source Software groups in particular, Annabi (2005) studied group learning in a natural setting, comparing across multiple learning episodes to identify factors that promoted or hindered learning. The study employed an embedded case design. The case for the study was the Apache Web Server `httpd` project, a successful Open Source Software project. The embedded unit of analysis was Learning Opportunity Episodes (LEO). Annabi (2005) collected and analyzed data from group email interaction (the raw data) over a ten month period.

Stage I: Conceptualization of episodes

As noted above, identifying episodes requires a conceptual definition of the phenomenon of interest. The researcher developed an initial theoretical framework to identify and explain group process and outcomes. Building on Huber's (1991) definition of learning, Annabi (2005) defined learning as ***the process by which group members share knowledge and information, integrate it into the group's explicit rules and shared mental models, and thereby create changes in the behavioral potential of the group***. Annabi (2005) therefore defined a learning episode *as a group event that occurs over time as a result of a learning trigger that may lead to changes in the behavioral potential of the group* (see figure 2).

From the literature on group learning and organizational learning, Annabi (2005) identified a number of triggers (potential beginnings of the episodes) that provide the group with opportunities to learn according to the identified definition. Annabi (2005) theorized that group learning processes follow these learning triggers and lead to change in explicit or implicit rules (the output) as suggested in the definition. The change in behavioral potential (the potential end of the episodes) was operationalized as changes in explicit and implicit rules.

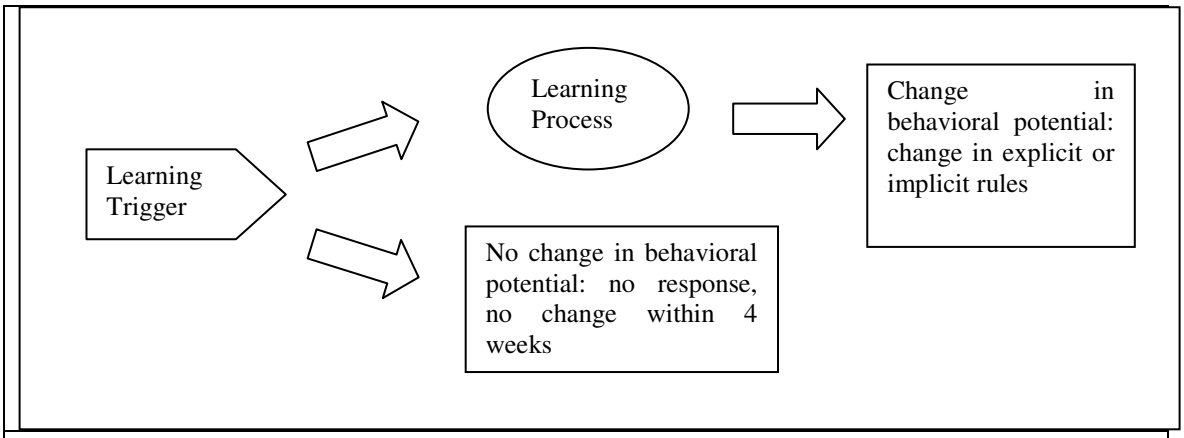

Figure 2. Learning Opportunity Episodes (Annabi 2005)

The result of choosing LOE for the embedded unit of analysis was to focus the researcher's attention on the group's response (or lack of response) to learning triggers: the opportunity to learn. The intention was to compare a group's response to learning triggers when group learning does occur with the incidents when group learning does not occur. This furthers the researcher's understanding of the learning process and those factors/behaviors that enhance or impede learning. Using episodes was especially suitable here, as the goal was to understand the characteristics and not just identify variance.

Stage II: Identifying the Episode

Once the LOE was conceptualized in this way, the researcher's task was to develop a systematic and reliable way to identify LEO from the vast nature of group behaviors. Annabi (2005) identified and selected LOE by identifying learning triggers, indicators of learning process, or identifying explicit changes to rules as follows:

1. The most straightforward and reliable way to identify a LOE was by identifying *specific, explicit rules or changes in explicit rules*, that is, clear evidence of the end of a LOE. These explicit rules and procedures were identified in three ways. The first way was to identify direct references to rules or changes in rules recorded in the archived or existing Web pages or documentation. An example of this was on the current Apache httpd webpage http://httpd.apache.org/dev/: there was a reference to the "old voting guidelines" created in March 1995, modified in September 1995 (see http://httpd.apache.org/dev/voting.html). The second way was to compare different versions of rules in the archived pages (e.g. Web site, archived documentation, to do lists, change logs), over time. These archives were publicly available on the Apache.org, Wayback Machine (internetarchive.org), and through developers. However, no episodes were identified in this way in this study.

   The first two ways mentioned above were limited by lack of availability of all versions of the older material. However, identifying these changes and referring back to the interactions (process) that lead to change were important for two reasons. First, this helped identify LOE. Second, this method allowed the researcher to trace the interactions back to the learning triggers. Identifying learning triggers in this fashion further builds the coding scheme for learning triggers available in the study. This improved the validity (selection bias) and reliability of identifying triggers.

   A third way to identify changes in rules and guidelines was through explicit reference to rules or guidelines or changes in rules in the mailing archives. This was accomplished by keyword searching or browsing the archives of the mailing lists for terms that relate to changes in rules. Keywords used for searching were "change in rule," "change in procedure," "proposal," "new plan." In the pilot study, keyword searching proved imprecise, as it resulted in only one episode from a year's worth of interactions (40 messages a day). Thus the research did not utilize this method throughout the project. However, when browsing the mailing archives, the researcher was able to identify messages that presented and discussed a change in rules. Once those indications were identified, the researcher then browsed for all messages related to the creation or change in that particular rule to capture the

learning opportunity episode. The example below illustrates one instance where an explicit reference to guidelines (in this case for the patch coordinator responsibilities) was identified in the mailing list.

Example (9/11/1995, 0813 patch coordinator)

While browsing the mailing list, the researcher identified a message that provided guidelines for the patch coordinator (see the quote below). This message was traced back to the learning trigger (misrepresentations), and all related messages were captured and analyzed.

```
A patch coordinator needs to
1) maintain the patch repository for that particular build
   a) make sure things are organized intelligently with comments in the
      patches as to why the patch is needed
   b) monitor the mailing list and newsgroups for patches.
2) do a sanity check on the patches submitted first
   a) make sure they patch cleanly - if not, create a clean patch using diff
      -C3 which does not depend upon other patches
   b) make sure patch makes sense in the context of the architecture and the
      principles of cross-platform and least-astonishment
   c) do an initial test on the patch to make sure it does what it claims to
      do; if any of these fail, ask the patch submitter to submit again.
3) when a sufficient number of patches have been submitted, close the patch
   submission for this round and leave two or so days for comments/testing
   of the various patches. Then, create a ballot and send to the list - hold
   the vote open for a day or two, and then tally.
finally, present results to the list and build the next release.
```

2. Another way to identify LOE was by identifying internal or external learning triggers that might or might not lead to change in behavioral potential (i.e., by identifying the beginning of episodes). This identification was done by browsing the mailing archives of OSS interactions over time, coding messages as triggers or non-triggers. Because it was expected that not all learning triggers would lead to actual learning (indeed, one question was which did and which did not), in addition to the changes noted above as outputs to an episode, an alternative ending was defined based on elapsed time with no evidence of learning (i.e., no other ending). The average time between learning triggers identified in this study was one week. The researcher considered a learning opportunity episode to have no change if one month passed without a direct response to that trigger (the average between learning opportunity episodes times four). Identifying LOE was critical to focusing the researcher's attention on relevant constructs. Once LOE were identified and collected, the researcher was able to focus on analyzing the characteristics of group learning process by analyzing group activities most relevant to learning triggers and activities identified in the literature relating to learning.

Example (11/10/1995, responsible for sco)

While browsing each email message in the mailing archives the researcher identified a learning trigger (misrepresentation) that potentially provides the group with an opportunity to develop shared mental model. The member posting the message did not know who the correct person was for developing SCO binary files. As a result of this person's question to the group, the other members and this person could develop shared mental model about who was responsible for SCO. Related messages in the mailing archives were collected once this learning trigger was identified.

```
Who is the correct contact for SCO? And do we have any binaries
available for SCO? Almost any version would do.
```

However, in this episode, there was no response to the learning trigger. The mailing archives were searched for the following four weeks; then the episode was identified as one that did not lead to learning.

The researcher developed a codebook for identifying learning triggers from browsing the interaction data. The code book was tested for inter-coder reliability. Table 1 provides a summary of the final version of the identified learning triggers.

Table 1. Learning Triggers (Annabi 2005; 2007)

Learning Trigger	Indicator	Description
External	User Need	A request by users for new product features, no distribution channels, or new help pages
	New Technology	Introduction of new technology that allows/or requires doing things differently
	External Expectation	Indication of pressure from other developers, or the outside community to change a process or a product
	Offer to Contribution	A request or inquiry from co-developers or active users to contribute to a particular part of the project
Internal	Misrepresentations	Indication of misunderstandings of how things should be done and what the expectations are
	Conflict	Indications of interference by member or group when another member or group is attempting to achieve a goal
	Lack of Resources	Not enough people, machine power, or appropriate procedures to perform tasks
	New Member	Introduction of new member to the group
	Error	Process or product mistakes brought about by members or co-developers and users
	Efficacy of the Process	Problems with the effectiveness and efficiency of how tasks are handled and completed brought forth by members or co-developers

3. The third way to identify learning opportunity episodes was from indicators of the *learning process* (i.e., the middle of the learning episode). When browsing mailing-list archives, indicators identified in the learning process were often observed before the learning trigger or the learning outcome was identified. Once these indicators of learning were identified, a search was undertaken for learning triggers and indicators of learning outcomes (changes in shared mental models or rules and procedures). The learning triggers and learning outcomes were assessed and captured along with all related messages. The researcher developed an extensive coding scheme to identify group behaviors associated with group learning from the literature and further developed this scheme through multiple iterations of the data analysis. The coding scheme was also tested for inter-coder reliability. We were unable to present that coding scheme here due to space limitations; please refer to Annabi (2005).

   The example below illustrates an instance where the researcher identified recapitulation in one of the messages. Recapitulation was a behavior that was identified in the coding scheme as part of the behaviors that develop shared mental models. After identifying this behavior the researcher traced back to the learning trigger and captured all related messages.

Example (http 11 5/4/1995)

```
Danny Hillis has a story he tells about a conversation in the hotel lobby
at a computer conference around 1972. The topic is where the exponential
curve in computer sales is going to top off—no one's sure, but there has
to be a limit. After all, quips one of the guys, what are people going to
do with them all—put a computer in every doorknob?

Twenty years later. Same lobby. Same people. Same hotel—but they've just
installed a keycard system with programmable locks. There is a computer in
every doorknob.
```

4. Finally, interviews also contained questions asking interviewees to identify events that led to changes in explicit or implicit rules and learning triggers that did not lead to changes in rules. Since the interviews were limited, this method was not as fruitful in this example.

Once a message, page, or document was identified as being part of the LOE (learning trigger, indication of change, or element of a learning process), the related interaction messages and documentation were collected. Essential to the validity and reliability of this study was identification of the coding schemes and systematic going through the data systematically to identify each element within the LOE.

Stage III: Analyzing the Episode

Once the episodes were captured, the researcher's attention turned to characterizing and analyzing the group learning process represented in these episodes. To address this stage of the analysis, Annabi (2005) developed two content analytic coding schemes: one for learning triggers and a second for the characteristics of the learning process. These schemes were used to analyze interaction data and related documentation for characteristics of the learning process. This was a within-episode analysis, intended to illuminate the nature of each episode and get a rich understanding of the various behaviors that occur in the group learning process.

Table 2. Characteristics of Learning Opportunity Episodes Captured in the First Round of Data Collection and Analysis
Date
Topic
Product vs. process
Type of episode (Shared mental models, rules, or both shared mental models and rules)
Learning trigger (using coding scheme for learning triggers)
Member initiating the episode
Learning outcome [0=no learning, 1=change in SMM; change in rules 2; change in both 3]
Kinds of learning (explain the results/what happened)

To understand the characteristics of the group learning processes it was essential to also understand the specific behaviors occurring in the learning process and the factors that enhance, impede or simply vary these processes. The researcher noticed differences in learning outcomes based on the learning triggers and the member introducing the

trigger. Also there were differences noted between the focus of the LOE and the learning outcomes it led to. To understand these variations systematically, it was important to develop a means of capturing these variations. To this end, the researcher developed a third coding scheme. This scheme was an episode-level scheme that captured the nature of the episodes themselves: the differences in learning process characteristics and outcomes based on the learning triggers, the focus of the process, and those involved in the learning process. Table 2 includes the elements of the episode-level coding scheme and their definitions.

The outcomes of the analysis provided the researcher with the opportunity to address the research questions. Episodes enabled the researcher to analyze the details of the learning process in any one LOE. As well, LOE enables the research to compare across the various episodes to identify the factors that may enable or inhibit learning.

Discussion

In this section, we discuss some of the benefits and challenges in using episodes as a unit of analysis following the three-stage coding method presented above. As suggested in our discussion so far, the main benefit of using episodes in conducting research in realistic context is enabling researchers to repeatedly and reliably bound phenomena to isolate the constructs most relevant to their research question. This bounding is important for both the internal validity and reliability of the study in question (Punch 1998). The use of episodes helps ensure the trustworthiness of research by addressing some of the main issues presented by Miles and Huberman (1994). Our presentation uses the terminology of, and builds on, previous works by Guba and Lincoln (1989; Lincoln and Guba 1985; Lincoln and Guba 1990).

First, the systematic identification of episodes helps enhance reliability of research. Reliability addresses the question of whether the assessments used in the study's processes are consistent and stable over time, across researchers, and methods. To assess reliability, researchers typically ask: Is the researcher's role and status within the research site explicitly described? Were codes and checks made, and did they show adequate agreement? Do multiple observers agree in their accounts and interpretations? To this end, using episodes, and explicitly describing how episodes can be identified and analyzed, enables multiple researchers to assess the phenomenon in a consistent way. IS researchers studying processes and practices often use case studies and various types of ethnographies to investigate their research questions. Walsham (1995) suggests that researchers studying processes and events using ethnographic methods introduce their own biases and conceptions on what is observed and what data is collected, which potentially reduces the reliability of the data (admittedly, not always a key concern of ethnographers). Episodes could reduce these biases as researchers consciously develop explicit ways in which they collect and identify data that can later be checked for reliability.

Second, the use of episodes as a unit of analysis may focus data collection, making a study easier to carry out. One of the main challenges of conducting research in naturalistic studies is the vastness of human behavior and abundance of data. Researchers using methods such as observation, ethnographies, and case studies may get lost in the context and collect data that ends up being less relevant to their specific research questions. Using episodes that are clearly defined enables the researchers to be more selective about the data they collect. This makes the data analysis more feasible and the observation periods more focused and timely.

Third, the use of episodes as a unit of analysis may enhance the internal validity of the study. Internal validity raises issues of the true value of the conclusions of the study. Do the findings make sense? Are they confirmable? Do they conform to our understanding of the world arrived at from other sources? Researchers can assess internal validity by asking questions such as: Did sources of evidence produce generally converging conclusions? Are the findings internally coherent? Episodes direct the researcher's attention to aspects of the phenomenon most relevant to the research questions in a systematic, pre-specified way. As a result, researchers are better able to reach conclusions about the phenomenon and see consistencies and inconsistencies in the relevant aspects of the concept rather than get lost in other less relevant aspects of the phenomenon (Miles and Huberman, 1994).

Finally, a main challenge is that achieving these benefits hinge on the researcher's ability to clearly identify the constructs relevant to the research questions, and so to craft a clear definition of the boundaries of the episode. Identifying the elements of an event, process, decision, or change is complex (Yin 1994). Yin (1994) specifically cautions researchers that these types of events are difficult to identify since it is often difficult to determine their beginning and/or the end. The definition of the episode's elements often is derived from an understanding of the phenomenon as described in the literature. The researcher's job them becomes to more clearly articulate the phenomenon and identify it temporally. It is important to create a systematic means to identify the beginning and/or

end of these episodes. Identifying elements of the intermediate (between the beginning and the end) characteristics of the phenomenon can also be helpful. To address this challenge, in the following section we present an example of operationalizing episodes for a study examining learning in distributed groups which should illustrate the elements of episodes and how they may be systematically described and identified through the process of research.

Conclusion

The main objective of this paper was to describe an approach to studying processes and practices that are best studied in their naturalistic setting. Using episodes to focus the research on the concepts of interest from natural human behavior enhances the validity. More importantly, systematically identifying episodes allows for research designs that more reliably compare across instances of the phenomenon, thus leading to a deeper understanding of the practices or processes of interest. For example, in other work, the authors have examined the nature of decision-making in distributed teams by identifying decision making episodes, that—conceptually at least—begin with some opportunity for the group to decide (e.g., a patch proposal that has to be accepted or not), proceed through some decision process (e.g., discussing alternatives or implications) and end with an announcement of a decision. Interestingly, this analysis revealed that decision episode are often structured in other ways, e.g., beginning with the simultaneous announcement of a problem and decision, followed by discussion of whether that decision was correct. Identifying multiple episodes of decision-making enabled the researchers to examine variations across decision-making practices in various teams.

Using episodes to study social behavior is not a new concept. Researchers as early as the 1970s (Giorgi 1975) used episodes to focus their research. Scholars like Miles and Huberman (1994) and Yin (1994) suggested the use of episodes in their methodologies. Where early scholars stopped short was in providing us with details about how to systematically identify, collect, and analyze episodes in our research. In this paper, we presented a three-stage method to identify elements of episodes and a way to systematically identify, collect and analyze them. Episodes are could be especially useful in IS research, which often studies processes that are embedded in complex systems and whose study generates large amounts of data. These episodes are especially useful for studying virtual teams or organizations for example. Such phenomenon leave a vast digital trace that is readily available for researchers to investigate, if the phenomena of interest can be isolated.

Some of the main challenges in using episodes as the unit of analysis stem from the difficulty of identifying their elements. Identifying the beginning, middle and ending of episodes requires solid conceptual understanding of the phenomenon in question, supporting the development of coding schemes for each element. Scholars must be diligent in specifying how they identify the various elements. Additionally, due to the richness of the data they might get, researchers are continuously looking for ways to automate the analysis process of rich qualitative data that the use of episodes could generate. Collaborative research between scholars from various fields and Natural Language Processing tools could prove useful in this regard.

Episodes could prove to be a powerful methodological tool for researchers from disciplines other than information systems, as the early users were in sociology and psychology. Scholars in education and management science could also use episodes to study phenomenon such as peer learning, implementation of new programs or structures, organizational culture and change, among other things. Essential to using such a methodology is the researchers' diligence in defining the concepts of interest and developing systematic techniques in identifying, collecting, and analyzing elements of the episodes.

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