The Contextuality Problem in Information Systems Research: How the Interplay between Paradigms Can Help

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Introduction

Some forty years ago Simon (1969) used the metaphor of an ant crossing a beach to illustrate rudimentary principles of context-dependent behavior. The ant travels across the beach following what seems to be a wobbly line. The ant's trajectory is complicated as the beach is strewn with pebbles, rocks, and other obstacles. The apparent complexity of the ant's behavior as it moves seems largely a reflection of the complexity of the environment (the beach) in which it is embedded. This metaphor emphasizes the constraining and enabling roles that "context" can play in shaping behavior. This is echoed by system theory which asserts that any phenomenon has an "environment" with which it is inextricably intertwined (Porra 2001). More pointedly, Simon's metaphor helps make clear that scholars of information systems, like most social scientists, build from an often implicit dynamic between micro-activity (the ant's movements) and macro-structure (the obstacle-strewn beach).

Acknowledging the complexity of any social reality leads us to examine the ongoing interactions between the micro and macro perspectives. To better understand these micro / macro interactions, a useful theoretical conceptualization needs to address the context within which the practices unfold. In doing so, the researcher must go through a process of *contextualization*. Contextualization is the "linking of observations to a set of relevant facts, events or point of view that make possible research and theory that form part of a larger whole." (Rousseau et al. 2001) This contextualization process allows researchers to build situational and temporal conditions directly into their theories, and relate these to conceptualizations of embedded phenomena of interest.

However, the contextualization process is framed by trade-offs. Contextualizing leads researchers to explore deeply the environment of study and to integrate the meanings and interpretations into their theoretical model. Paradoxically, and due to the idiosyncratic nature of each context, the results of this process will likely be considerably skewed towards the particularities of the context of study. As such, models engendered by context-rich studies are more difficult to abstract from and, hence, to generalize. We call this trade-off between rich contextual insight and cross-context generalization *the contextuality problem*. Several attempts within information system scholarship have been made to redress the problem (i.e. Webb and Mallon (2007) proposal for bridging the gap between generalizability and particularity in IS narrative research). However, this general vs. particular and breadth vs. depth tension continue to linger (Pentland 1999).

Reconstructed Logic

We acknowledge the ontological differences inherent to these approaches to representing context. And, we seek some means to redress the differences with regard to context, knowing that doing this will challenge the less pragmatic stances of colleagues who see these as incompatible. Our approach to redressing the contextuality problem is to frame this as the uses of reconstructed logic relative to logic-in-use. A reconstructed logic is an idealization (not a description) of scientific practices (Kaplan 1964). An example of this idealization is the variations of experimental approaches to field-based research: it is not possible to control all confounds, as the idealization of an experiment demands.

To idealize the contextualization process, we draw on the definition proposed by Pettigrew (1985). While situated in his research regarding strategic organizational change, the framing (if not the topic) is valuable for the case we are making. Pettigrew looks into the history of emergent change in organizations, arguing that events are situated in their settings. The changes Pettigrew suggests are shaped by the organization's social, economic and political context. Context, in his view, influences action even as it is also being shaped by actions. His analysis mainly rests on two dimensions of context: the *horizontal* and the *vertical* (See Figure 1). This argument is echoed by Suchman (2007) (who focuses on a much different subjects): she suggests that scholars should situate the research phenomena in extended spatial and temporal relations.

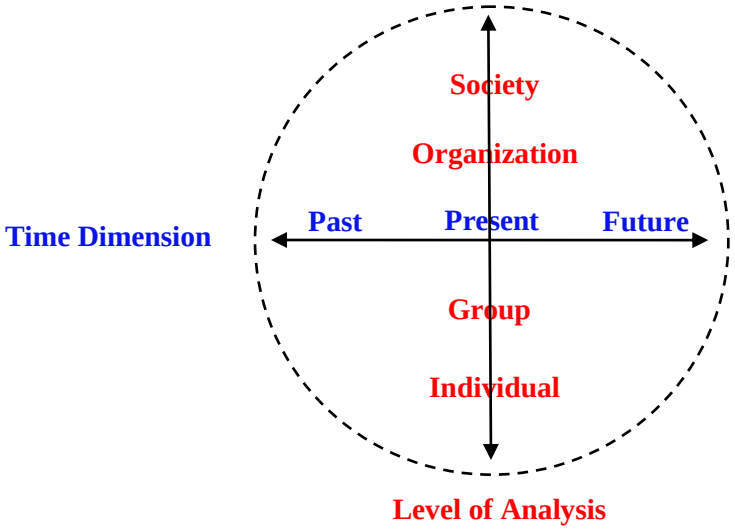

Figure 1: The Horizontal and Vertical Dimensions of Contexts

In a *horizontal analysis* of context, researchers are concerned with the temporal sequences of events. This includes history, present, and the future, of events. For instance, if the current state of an information system were the phenomenon under study, researchers would seek to investigate when the first interactions between the system and the organizations started (e.g. Tyre et al. 1994). These scholars would further complement this historical analysis with a synthesis of the current situation, and some cogent predictions regarding how the context might be evolving into the near future.

A *vertical analysis* of context focuses the researcher's attention to the interplay among broader and more bounded levels of the social milieu. Even though assumptions regarding discrete context levels may seem both a difficult and perhaps a risky proposition, it is a common analytic effort. More broadly, disciplines (i.e. sociology, psychology, and social psychology) are framed in part by differing levels of analyses. Certainly isolating an influence rooted in any one level of social abstraction will lead to a less rich picture. Nevertheless, researchers often center their attention to phenomena by first determining a level of analysis as a starting perspective (e.g., Klein et al. 1994). For example, much of the Human Computer Interaction (HCI) research often focuses on individual and groups level of analysis. This is understandable, given the problems of interest and the disciplines (i.e. psychology, social psychology) from which much of this work emanates (Kaptelinin et al. 2003).

Seen this way, an idealized contextual enquiry would need to be sufficiently attentive to both horizontal and vertical dimensions of analysis. Given the possible variations on how to develop these, information systems scholars are better served by an assortment of theories and conceptual frameworks where the context is more carefully developed along vertical and horizontal components.

Logic-in-Use

By logic-in-use we mean the ways in which logical cognitive style and procedures are used by researchers in their actual practices. The logic-in-use could be different from a reconstructed logic, which is explicit formulation and idealization of the logic and procedures. When it comes to the logic-in-use regarding context, two distinct strands of research stand out within the broad information systems research community. As Dourish (2004) makes clear, one strand views context as a representational problem. The other view of context is as an interactional problem. The former is normally associated with a positivist approach, while the latter is often referred to as an interpretivist perspective.

The central problem for the positivist is "what is context and how can it be reduced to something that can be measured or encoded?" Seen this way, context is regarded as discrete pieces of information. Moreover, content (the phenomenon of interest) and context can be separated. Context is also defined as something delineable and stable: this means the contextual representation will not vary from instance to instance. The relevance of any contextual element is taken to be mostly or absolutely similar across contexts. To this end, most conclusions drawn by scholars embracing this view are seen as a-contextual and the findings are argued as holding true across disparate contexts (Davis 1989; DeLone et al. 1992; Goodhue et al. 1992).

In contrast to the a-contextualist approach, there is also interpretive research on information systems (e.g., Walsham 1993) where context is framed as an interactional process. The central concern in this approach focuses attention to how and why people in their recurrent interactions maintain a mutual understanding of the context (Avgerou 2001). The major ramification of this view is that phenomena – like an information system – cannot be divorced from the ways that people use them (i.e. Sproull et al. 1991). Here, the underlying assumption is that the content and its social context are so intertwined that any separation is a misleading simplification (Callon et al. 1989).

Positivist arguments are developed by decomposing and abstracting away numerous contextual elements. Out of countless elements, only a few survive the tests of importance that are central to the focus on generalizing. Hence, the theories and conceptual frameworks only look at some concrete relationships (mostly causal) between a few numbers of variables. Other related phenomena are controlled for or considered "error variance" (if their influence is regarded as meager).

In contrast to the positivist approach, the context is fully problematized in the interpretivist approach. In other words, in their analysis, the scholars who focus on situating their work seek to examine all contextual factors. This sort of enquiry leads to a holistic view of context, which does not diminish or remove contextual elements, even those with scanty influence. The data collection and analysis as such aim to dig as deeply as possible to disclose particularities of a specific context (or contexts) (Klein et al. 1999). No variable is controlled. Instead of causal relationships, the situated scholar develops narratives as profound explanations of the phenomenon and the context within which it arises (i.e.Kling 1999; Kling et al. 1980). This is at odds with the representational concerns of positivists, and is more affiliated with interpretive approaches. In this view, context is not taken as fixed or delineable, but defined dynamically. Context arises from activity and is produced and reproduced in the course of the activity at hand.

Our premise here is that most of the research within information systems can be categorized into the two perspectives outlined above (Orlikowski et al. 1991). Certainly some researchers may not be aware of the distinctions, and others may not make explicit their notion of context (Lee 2004). No matter, our point is simply that most of the research done by information systems scholars falls into one of the above categories.

A second point to note is both approaches suffer from (different) contextualization deficiencies. A positivist study can suffer from a lack of contextually-relevant richness. This reductionism often provides great knowledge about parts, but loses the richness of the whole (context) (Courtney et al. 2008).This is because many contextual elements are not taken into consideration, as these models are designed, based on principles of parsimony, to explore a few variables. As a result, the theoretical frameworks brought forward by scholars taking this approach might not include an array of variables that differ from a context to context. These become un-accounted for in the de-contextualized model and may possibly obscure the research results.

Conversely, interpretive studies typically develop a detailed accounting of context. The interpretivist approach to research provides scholars with a means for accommodating contextual understanding and a rich description of the embeddedness of the phenomena. This thick understanding of the context often lends interpretive research more internal validity. However, interpretive scholars are often unable or unwilling to bring their deep insights to bear on other settings or contexts. This makes interpretive results more difficult to generalize to other contexts.

Broadly speaking, then, the logic-in-use of information systems can be represented by the two divergent and seemingly incommensurable perspectives. And, both seem inadequate when it comes to production of both generalizable and context-rich theories. As we intimated at the outset, the contextuality problem can be seen as the complexity/ uncertainty argument of Simon (Simon 1982). Simon argued that any situation is characterized in terms of the degree of complexity and the degree uncertainty. The degree of complexity represents the amount of relevant information that is available in a given situation; the degree of uncertainty represents the availability and validity of information that is relevant in a given situation.

Relative to depicting context, positivist research demonstrates a high degree of uncertainty and a low degree of complexity. As discussed, the positivist's pursuit of parsimonious theoretical models means consciously choosing to ignore additional contextual information. The focus on developing a limited number of variables may leave out some precious and relevant contextual elements, since these elements are entwined (Courtney et al. 2008). The simplification and abstraction required for authentic positivist designs, while diminishing complexity, often masks interesting features from the subject of study. For example Kaplan and Duchon (1988) argue that the "stripping of context buys objectivity and testability at the cost of a deeper understanding of what actually is occurring" (p. 572).

Interpretive researchers are well-positioned to elicit contextual information, reducing uncertainty. Intepretivists strive to take a full account of context and the way it relates to embedded phenomena. However, interpretive approaches are susceptible to complexity problem as the number of concepts and connections needed for understanding might become overwhelming relative to analysis.

In any context-based research, there are virtually an infinite number of contextual parameters to consider (Mumford 2003). In this light, interpretive researchers often have a difficult time organizing contextual variables, isolating idiosyncrasies from commonalities, and finally articulating an abstracted theoretical model that could span across a reasonable number of organizational contexts (e.g., Leonardi et al. 2008). In interpretive research, the effort to generalize findings is also generally done post-hoc. This is because the situated nature of the analysis means much of the insight on concepts and relationships cannot be predetermined. These relationships among concepts can only be brought to light through the researcher's involvement. Only then can the interpretive researcher look for contexts that share commonalities with the context within which he or she has conducted the research (See Table 1).

Approach	Perspective	Issue	Context Approach	Abstraction vs. Representation	Result	Outcome
Positivists	Reductionist view (focuses on only more important elements)	Uncertainty (many contextual elements are left out)	Control contextual variables	Abstracting away idiosyncratic elements	Parsimonious models	More generalizable
Interpretivist	Holistic view (tries not to isolate any elements)	Complexity (too many identified contextual elements)	Problematize context	Representing idiosyncratic elements	Detailed and localized models	More internally valid

Table1: Comparison Between The Two Paradigms

Given these differences, and as noted, some scholars posit that no reconciliation between these two conceptualizations can be achieved. For example, Burrell and Morgan (1979) argue that the two views are mutually exclusive paradigms. That is, any move toward the other extreme would amount to an implicit assumption that the alternative effort was misguided. Relative to information systems, Dourish (2004) echoes this argument, stating that sharp epistemological differences make these two positions incompatible. That is, the concept of "context" suggested by the positivist tradition, and the interpretive account, are similarly incompatible.

A model supporting contextulity dialog between paradigms

Building from this framing, and in contrast to those arguing for irreconcilability, we argue that an interchange between the two paradigms is needed in order to better address the contextuality problem, independent of the incommensurability contention. Our premise is not reconciliation, but scholarly pragmatism, emphasizing that scientific inquiries should be useful in solving real-world issues, not simply "ivory-tower thinking." (Churchman 1948) In this regard, our primary question is what we can use from the work done by others in a productive fashion?

We advocate a more proactive interplay between these two paradigms, one that acknowledges both differences and parallels in terms of the notion of "context". Such interplay will allow researchers in both traditions the possibility of reaping benefits by drawing findings from studies conducted within the frame of one paradigm into the conceptual frameworks of the other. This process is rooted in the processes of de-contextualizing and re-contextualizing, done in such a way that they inform the research within a different paradigm (Schultz et al. 1996).

Given strong social, intellectual and historical differences among many of the practitioners of these two intellectual camps, we proactively note that we are not disregarding the importance and practical issues of entrenched ontological and epistemological differences. Rather than conflating the differences in pivotal principles, we focus here on building from work in the pragmatist school of philosophy of science. We argue for "whatever philosophical and/or methodological approach (that) works best for the particular research program under study" (Tashakkori et al. 1998). This view on the *doing* of science espouses using whatever approaches seem most useful or appropriate to deal with context in our research enterprise. This approach orients one to resolving a specific problem, in this case contextuality, and does not engage the differences across all aspects of the debate.

For pragmatists, what counts is not origins but outcomes (Kaplan 1964). So, researchers from different paradigms should be able to draw on the results of studies affiliated with a contesting camp, no matter their perspective. Our pragmatic approach to depicting context is premised on the dichotomy represented in differences between the context of discovery and context of justification, as suggested by Popper's philosophy of science (Popper 2002). The process through which a theory is discovered is referred to by Popper as *the context of discovery*. This relates to induction wherein theory or general statement is extrapolated based on a number of given instances. According to Popper, *the context of justification* has to do with the empirical testing of a theory. The validity of a theory is not ascertained in the context of its discovery, but in the context of justification. The context of justification involves deduction -- where the predictive value of a theory arises from the crucible of supporting empirical evidence. The asymmetry between the context of discovery and the context of justification suggests that "as long as the theory survives empirical testing, its origin makes no difference" (Lee et al. 2008). The deductive approach, used in the context of justification, is independent of the process within which the theory has been constructed.

Framing research as building from the context of discovery and refining through the context of justification, we can discuss a model which facilitates the interchange between the research done through these two paradigms but does not require scholars in these different paradigms to focus on common contexts of discovery and justification. Earlier, we argued that a critical aspect of the reconstructed logic of our field is producing theories that give rise to rich contextual insights while being reasonably illustrative across different contexts. We further noted that the two dominant paradigms took different approaches to representing context and that the two approaches were, each in their own way, incomplete. We argued that the two paradigms would each be better served if they were able to capitalize on one another's strength, thereby offsetting their own particular limitations.

Separating the context of justification from context of discovery allows adherents both perspectives to stay true to norms and central beliefs, while providing a means to pursue a more contextually profound and generalizable sets of arguments. The interpretive context of discovery, as mentioned earlier, gives rise to heightened understandings of context by focusing on the production of meanings and concepts used by actors in real settings. This work provides important insights into how meanings and their implications are shaped by contextual forces. This sort of research is known for its high degree of internal validity (Klein et al. 1999). The typical result is an array of implications regarding the content (the phenomenon) within *a* context. However, these implications are less generalizable due to an immeasurable amount of contextual and more or less idiosyncratic information. This situation can be characterized by a high degree of complexity. Here a positivist context of justification can come to play to decrease the complexity. Two ways of coping with complexity are abstraction and reduction -- the basic tenets of the positivist approach. Positivist scholars should be able to evaluate the result of interpretive studies to develop less complex and more abstract theories that should hold true across a larger number of different contexts.

On the other hand, the product of a positivist context of discovery will reduce the degree of contextual insights, leading to a higher degree of uncertainty regarding explanation. The higher degree of uncertainty can be addressed by an interpretive context of justification. The main strategy in the face of uncertainty is to generate more contextual information.

Since the context of justification is independent from the context of discovery, interpretivists can draw from the results and models done in the positivist tradition and evaluate them on the grounds of a given context. A general theory grounded in a positivist context of discovery would then be enriched through an interpretive context of justification (in essence, de-generalized somewhat by elevating the interactions with context).

In this way, a cyclic dialogue which addresses the contextuality problem can be established between paradigms. The model has its root in "the wheel of science" (See Figure 2) which strives to marry theoretical and empirical worlds (Wallace 1971). Empirical investigations are conducted within context of justification and context of discovery. The model explains the result of both empirical endeavors as theories. This is because the context of discovery would naturally lead to a theory, and the context of justification would touch the theoretical world through proving, revising, or rejecting previous theoretical constructs. The empirical investigation rooted in one paradigm represented by context of discovery and justification) can be used to address the limitations of the theories produced scholars following the norms of the other paradigm.

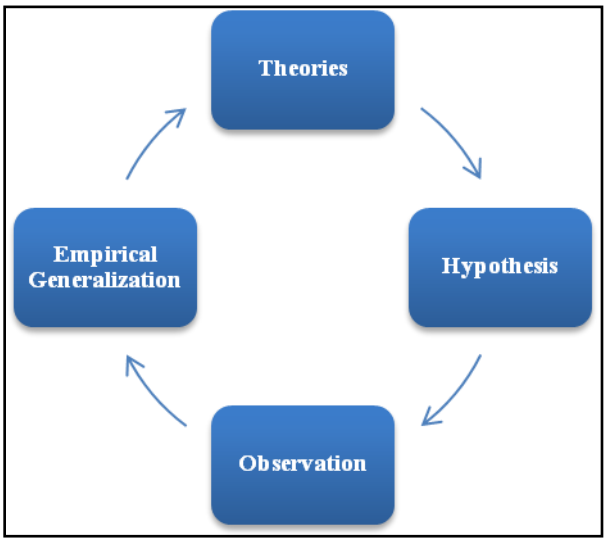

Figure 2: Wheel of Science, Adapted From (Wallace 1971)

Seen as a cycle, members of the different scholarly communities can each foster the empirical content of their theoretical postulations even as these are more available to scholars who hold to other traditions (Popper 2002). Both positivists and interpretivists can extend the depth and the breadth of core conceptual issues. Both are engaged in theory development and testing. Both contribute to the increasing depth and value of generalizable and contextual arguments. A positivist empirical enquiry can lead to insights that are valid across contexts (cover the breadth) whereas an interpretive empirical enquiry can heighten the depth of contextualized insight. That is, through this recursive interaction that both internal validity and generalizability improve. Hence, as for the contextuality problem, the two can function as complementary paradigms rather than contradictory or competitive truth regimes.

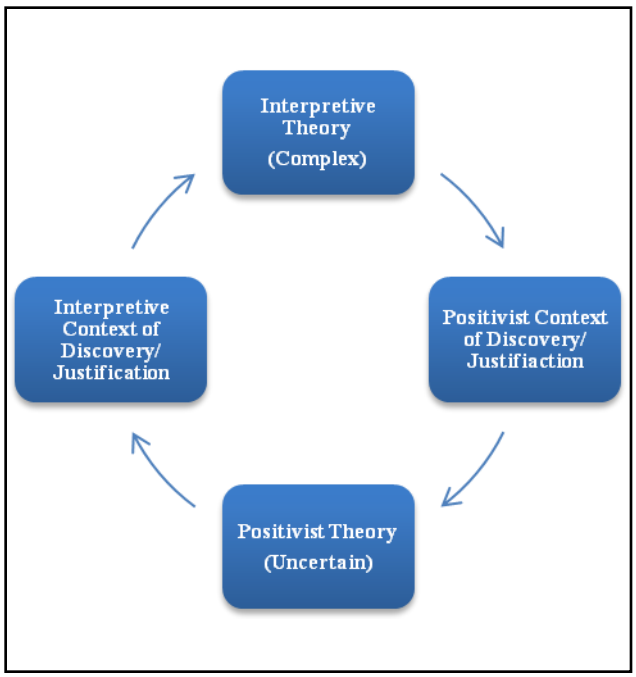

Figure 3: The Contexuality Dialogue Between Paradigms

Exemplars from the information systems literature

To help illustrate our argument, we introduce two sets of studies that model this inter-paradigm dialogue.

An Interpretive context of discovery leading to a positivist context of justification

In this first example we describe an interpretive study that is used as the basis for a positivist research design. Iacovou et al (1995) articulate a theoretical model for the determinants of the adoption of electronic data interchange (EDI). The model embraces *readiness*, *perceived benefits*, and *external pressure* as concepts that influence intent to adopt EDI systems. The research typifies what we call an interpretive context of discovery where the researchers generated a theoretical model, using an interpretive, case-based approach relying on interviews. The study was conducted based on work in seven organizations. These were suppliers to the British Columbia (BC) government, which was currently pursuing an EDI initiative. Although the model affords deep insights into the contingencies of EDI adoption within the context of these organizations, it is less amenable to a larger set of organizations and for those that are not the agencies in support of liberal democracies. The researchers recognize this, noting the need for further research based on larger scale studies to examine the validity and applicability of the model.

Later, Chwelos et al (2001) undertook an empirical test of the model in a positivist way. They designed a survey of senior purchasing managers of SMEs. The sample frame was chosen from purchasing managers of Purchasing Managers Association of Canada (PMAC); the researchers collected 317 responses. The study concludes that all three concepts (readiness, perceived benefits, and external pressure) would influence intent to adopt EDI. They found however, that external pressure and readiness are considerably more important than perceived benefits. This research can be characterized as a positivist context of justification where a positivist approach has been employed to deductively validate an interpretive model. This approach enabled the researchers to embark on a random sampling, and test a theory within the broader context of SME firms in Canada (which was assumed as the population). In this way, they have been able to go beyond the initial contexts within which the theory was constructed to craft a more fine-tuned but still generalizable theory (See Figure 4).

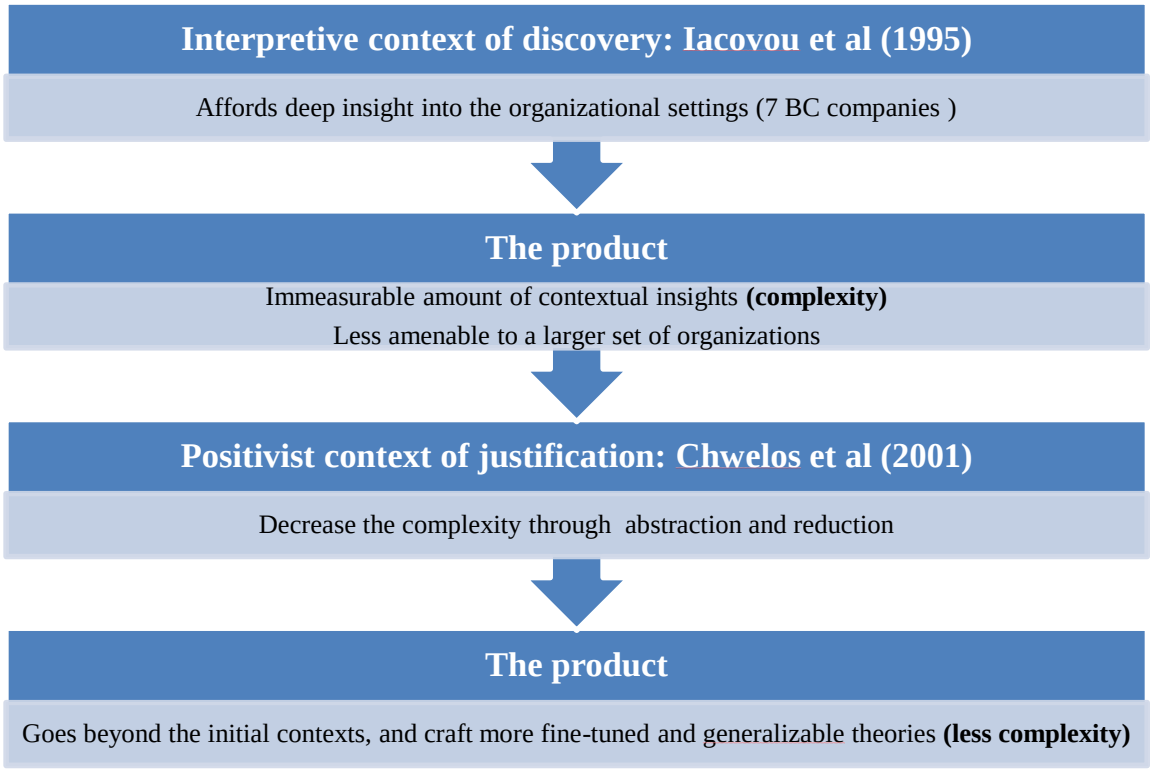

Figure 4: An Interpretive Context of Discovery Leading To a Positivist Context of Justification

A positivist context of discovery leading to an interpretive context of justification

The second example illustrates an interpretive context of justification which empirically evaluates a theory arising from a positivist context of discovery. Hofstede (1984) undertook a sizeable study of national culture. Although his dataset grew over the years, his methodology remained the same (McSweeney 2002). His primary data was extracted from IBM preexisting survey of employees' attitudes in 66 countries. These data were statistically analyzed in combination with some additional data and "theoretical reasoning" (Hofstede 1984). The resultant positivist model constitutes four central and largely independent bipolar dimensions of a national culture. These dimensions are *power distance*, *uncertainty avoidance*, *individualism versus collectivism*, and *masculinity versus femininity*. Here the positivist design, focusing on large-scale surveys, gives rise to general statements about the dimensions of a national culture which are assumed to be valid across numerous contexts. However, this model is incapable of conveying other interesting variables and dimensions which help us define a culture.

The model can be complemented by an interpretive context of justification through which deeper insights are offered regarding specific contexts. Relative to an information system phenomenon, Harvey (1997) examines the questions of whether Hofstede's framework explicates the actual practice of information system design. Taking an ethnographic approach, he compares the design of GIS in a German and American county. The research includes document evaluation, open-ended interviews, and more importantly the researcher's participation in the actual design process. This type of design was chosen because it delved into the distinct cultural and institutional contexts of each GIS. This interpretive context of justification led to a more context-specific understanding regarding the influence of national culture on information design practice. Harvey's investigation concludes that Hofstede's dimensions of national culture provide a sensible basis for understanding the influence of national culture on organization's self representation, but loses sight of the actual underlying practices of social activities. In regard to the two contexts, system design practices embody negotiations and a web of relationship between culture, and institutions (Harvey 1997). Thereby, this study, based on an interpretive context of justification, could enrich the Hofstede's model, constructed in a positivist context of discovery, by supplying more contextual information on specific situations and regarding a specific technological use (See Figure 5).

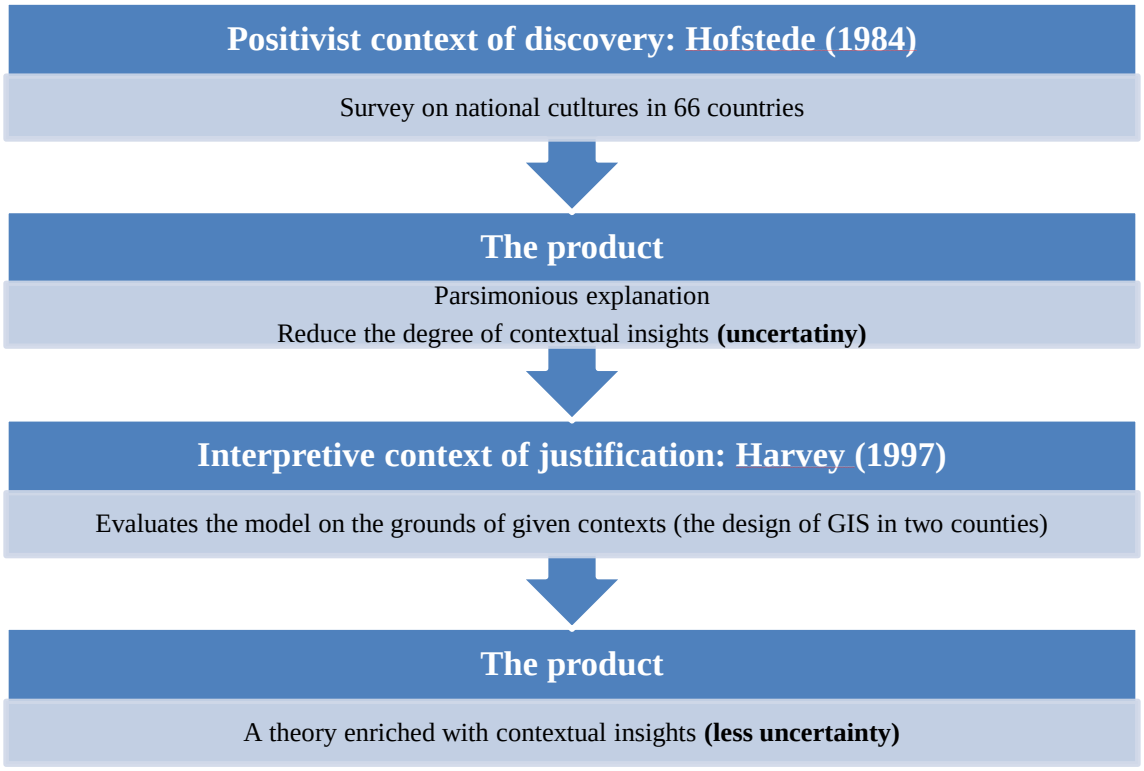

Figure 5: A Positivist Context of Discovery Leading To an Interpretive Context of Justification

Conclusion

We have noted that the logic-in-use in information systems research is plagued by the *contexutality problem* where the two dominant paradigms that guide our research each address but a part of the problem. Researchers in the positivist tradition are trained to focus on a small sets of variables and assume other variables fixed, "as opposed to (studying) systems of interrelationships among clusters of variables" (Parkhe 1993). These reductionist approaches are unlikely to capture the nuances of organizational practices. Scholars pursuing the intrepretivist tradition do not face such limitations. However, by explicitly accounting for contextual particularities, interpretive research is also criticized for its limited generalizability.

We argue that the model proposed in this paper can facilitate inter-paradigm interaction and address the contextuality problem. Building on philosophical pragmatism, we develop a means to facilitate the construction of meaningful bridges between scholars and their work who adhere to these two paradigms by directing attention to the conjoined problem of de-contextualization and re-contextualization (Wicks et al. 1998). Our model orients information systems scholars to frame their work in ways that allow connections to be made and to make clear the differences between the contexts of discovery and the contexts of justification. Furthermore, we suggest the types of resources and capabilities each paradigm can bring into the collective problem solving enterprise.

Our model also builds on an explicit need for research pluralism. Our view is that any single research perspective will likely obscure the contextualization process, since no research paradigm can fully accommodate the richness and complexity of diverse contexts within which information systems are situated. As a result, a single research perspective for studying IS phenomena is restrictive, and work from multiple philosophical assumptions can inform the study of information technology, people and organizations (Orlikowski et al. 1991). Goles and Hirschheim (2000) draw an interesting analogy between disparate research paradigms and religions. While there are differences between Christian, Islamic, and Buddist beliefs, there are parallels as well. By comparing and contrasting them, religious scholars are able to rise their understating of each in its own light, and a heightened appreciation of their links.

However, such a pragmatic pluralism cannot be achieved unless proponents of each paradigm come to recognize their weaknesses, and realize that there is something to be gained by interacting with their counterparts from that other paradigm. Due to the complexity of the phenomena that IS research seeks to explain, plurality of perspectives would allow scholars to explore the phenomena from diverse frames of reference. Central to this interplay rests the assumption that no one paradigm has a privileged position over the other nor is always superior in terms of problem solving capabilities (Goles et al. 2000). After all, the credibility of the information systems community is contingent upon its competence in handling practical problems. This, of course, requires that different research communities acknowledge one another and develop interrelationships regarding their research outputs.

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