

PLAY AS THE WAY OUT OF THE NEWSPEAK–TOWER OF BABEL DILEMMA IN DATA MODELING

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Abstract

A data modeler, when faced with different interpretations of a given reality within an organization, may opt to create a standard model for the whole company (the Newspeak solution). On the other hand, allowing multiple, and sometimes incompatible, models to coexist may lead to what some researchers call the Tower of Babel problem. The clash between these two possibilities creates a fundamental design problem for IS. We argue that the concept of play in Gadamer can be seen as the “place” where differences and similarities among various perspectives are expressed and discussed. Based on Gadamer’s Truth and Method (1960) and on Heidegger’s Being and Time (1962), we review the concepts of horizon, fusion of horizons, play, application, and the hermeneutic circle, and show some applications to information systems. Following Hirschheim et al. (1995), who consider that “the role of a data models should be seen in a similar light as the role of a theory for a scientific community,” we turn to the debate between objectivism and relativism in philosophy of science in order to discover a way of negotiating the clash between the Newspeak and Tower of Babel possibilities in Information Systems. We introduce an historical example of hermeneutical play—the Popper/Kuhn debate in the philosophy of science—which directly addresses the problems and possibilities associated with communication among people holding incommensurable perspectives. We show how this situation informed their hermeneutic play in the philosophy of science. Finally, we argue that a similar play, in conjunction with the dimension of application, is the way beyond the either/or of the Tower of Babel versus Newspeak dilemma.

Keywords: Data modeling, hermeneutics, IS design

Introduction

The existence of different interpretations of a given reality within an organization creates problems for data modeling. System designers may be left with two options. Either create an enterprise-wide data model or live with a multiplicity of models. The former is called the *Newspeak* solution. The application of the latter would result in the *Tower of Babel* problem. Following Hirschheim et al. (1995), who consider that “the role of data models should be seen in a similar light as the role of a theory for a scientific community” (p. 165), we propose to view the clash between the unity or diversity of data models in light of the discussion of the multiplicity of scientific theories addressed in philosophy of science.

A dilemma similar to that which has arisen in the integration of data models has been an important focus of discussion in the philosophy of science in the 20th century. This dilemma concerns the difficulties of communication among groups of scientists possessing distinct conceptualizations and interests, or as Kuhn (1962) would put it, living in different paradigms. Discussing this issue in *Beyond Objectivism and Relativism*, Bernstein (1983) has argued that the literature on philosophy of science points to a fundamentally hermeneutic understanding of both the natural and social sciences. It is important to emphasize that philosophic hermeneutics did not arise out of the issues in philosophy of science, but instead that a certain impasse in the philosophy of science, namely the central problems of communication and incommensurability, led Bernstein and others to introduce the hermeneutic discussion into the philosophy of science arena. In this context, we have taken up an attempt to approach the processes of integration of different models in terms of the categories of hermeneutics. We propose to explicitly

recognize the hermeneutic context that is always tacitly present, although largely invisible when the IS is working as intended and thus withdraws itself in its usability. Explicit focus on the hermeneutic context typically arises under conditions of communicative breakdown, when an IS is not working as intended. We believe that explicit hermeneutic contextualization can be helpful for the analysis and design of IS dealing with the problem of data model integration.

This paper is organized as follows. In the next section, we analyze the problem of integrating different perspectives in data modeling and the usual proposed solutions that lead to the Newspeak-Tower of Babel dilemma. In the subsequent section, based on Gadamer's *Truth and Method* (2003) and Heidegger's *Being and Time* (1962), we review the concepts of horizon, fusion of horizons, play, phronesis, and the hermeneutic circle. We then discuss how the concept of *play* in Gadamer can be seen as the "place" where differences and similarities among various perspectives are expressed and discussed. We clarify the relation of play to the problem studied in this paper by giving an historical example of hermeneutic play. We consider the Popper/Kuhn debate in the philosophy of science, which directly addresses the problems of communication and incommensurability across scientific paradigms. We show that Popper and Kuhn held interlocking complementary positions in which each asserted what the other presupposed. In the penultimate section, we show that the way out of the "either/or" of the Tower of Babel versus Newspeak dilemma is *play* worked out in the context of practical organizational activity. This conclusion points to the central role of phronesis, or practical wisdom, in the design and use of IS. We are led to consider the responsibilities of IS professionals in the guidance of organizations. In the final section, we summarize our conclusions.

The Tower of Babel-Newspeak Dilemma

In order to appreciate the importance of a hermeneutic analysis for the integration of different models in Information Systems (and especially the centrality of Gadamer's concepts of horizons, play, and phronesis) we need to reflect on the difficulties that emerge in situations of communication breakdown, where users possess different assumptions about the communicative context. One example of this set of difficulties is the so-called Tower of Babel problem (Smith 2003), which arises in the context of IS integration. This problem has been a fundamental barrier in the way of developing general and reusable data models (Fonseca and Martin 2005). The difficulty is that insofar as IS designers attempt to accommodate, in the same model, groups of users possessing distinct ontological assumptions, they must address the problem of integrating information in ways that are compatible with the perspectives of all significant stakeholders but which at the same time avoid restrictions on logical inconsistency. But how can this be done? It might be possible to work out *ad hoc* solutions for a particular, limited set of ontological assumptions, but such a strategy would be incompatible with the technological strategy, which aims at general models.

Accordingly, a classic maneuver on the part of IS designers, when faced with the Tower of Babel problem, is to force all users to accommodate to a single, enterprise-wide model. Here the burden is placed on the users to adapt to the designer's presuppositions. In this case, the subtlety and ambiguity of differing perspectives is simply ignored. This solution was called the Newspeak solution (Fonseca and Martin 2005), after George Orwell's introduction of the term in his novel *Nineteen Eighty-Four* (1949). Recall that in the technological society Orwell envisaged, there was an effort to create a reformed version of English (Newspeak) that was simpler and less capable of expressing differing perspectives than traditional English. As in the case of Orwell's novel, implementation of the Newspeak solution in the context of IS integration will likely require administrative authority to ensure that all users conform to the same ontological framework. In Orwell's novel, Newspeak was also an instrument of manipulative administrative control, enabling those led by it to be misled because it obscured the possibilities that might have been expressed through traditional English. This sort of control could also result from the implementation of IS Newspeak.

Despite its efficiency from the perspective of the designer (if not the user), a problem with the Newspeak solution is that it cannot be implemented in situations where users are required by the traditions of their own historical contexts to invoke differing ontological assumptions. For example, Smith (2003) cites Guarino (1995) who points out the difficulties of integrating accounting systems when different users are required by distinct traditions of case law to use different accounting structures. Even the same vocabulary items may have different meanings in different historical contexts. In such cases, differences in user orientation cannot be arbitrarily dismissed. They result from differences of history which continue to constrain the interpretation of problems and the standards for solutions. Such differences cannot be eliminated by administrative fiat. They are aspects of what Heidegger calls "thrownness" and constitute what Gadamer calls differing horizons.

In the development of IS involving scientific data, differences among horizons can also arise in cases where scientific paradigms differ, that is, where scientific activity is an open, controversial, and unfinished process. In such, situations the interpretation of data across paradigms is rendered to some extent incommensurable. Moreover, such incommensurability is often linked to cross

paradigmatic differences in meaning in ways which preclude the implementation of simple translation procedures. In these cases, the system designer must begin by respecting the differences among perspectives. He is not competent to decide issues which the communities whose views he wishes to record cannot unambiguously determine. If the model is to be useful to members of more than one community, then it will have to be constructed in ways that acknowledge the significance of alternative perspectives.

Currently, IS designers lack a framework for addressing the issues involved in communication across incommensurable perspectives. Consequently, they are faced with a choice between two equally problematic alternatives: either the Tower of Babel problem with its associated incommensurability, or the Newspeak solution and its imposition of an oversimplified set of categories. We think the hermeneutic approach initiated by Heidegger, and developed by Gadamer, provides such a framework.

Gadamer's Hermeneutics

In order to develop our response to the foregoing dilemma, we introduce a brief summary of the insights from the philosophical hermeneutics of Gadamer which we have found helpful in framing our own position. Central to his perspective is the view that the processes of understanding are always carried out in the context of certain historically conditioned prejudgments. Such prejudgments, or prejudices, cannot be arbitrarily altered to suit the convenience of systems designers. Such perspective constituting assumptions enable the processes of understanding, and, in particular, understanding communication, to go forward. Collingwood (1959) argued that the meaning of a communication cannot be understood apart from reference to the issue, or set of possibilities, it may be presupposed to address. Gadamer (2003) introduced the term *horizon* as a metaphor designating such frameworks of presuppositions about what is necessary and what is possible.

Horizons

According to our analysis, horizons must meet two conditions. First, competent communicators must know what can be taken for granted. This knowledge specifies the “ground” of communicative experience—including the dimensions along which the objects and events of the domain of inquiry will remain constant or show predictable variation. Second, the data must be orderable by communicators along dimensions that are systematically uncorrelated with the predictable background. This knowledge specifies the possibilities—the “edges,” or “figure,” of the world which can stand out in the act of communication. It represents what is in question. But this characteristic of “standing out” depends on the communicators’ knowledge that the background is uncorrelated with the ordering of the data which they have chosen to observe.

In this way, a horizon is a context from which a particular view of a given domain can emerge. As understanding unfolds and new considerations, or issues, come into view, the horizon is said to shift. Although horizons constitute limits on what is immediately accessible, they are not static. They are, as the metaphor suggests, open to movement, growth and development. In taking this position, Gadamer acknowledges the importance of currently held presuppositions, or prejudices, for the activity of understanding. There is no reference to an absolute foundation that constitutes a necessary and sufficient starting point for the growth of valid understanding. The horizon of any project grows out of the local historical and practical context of those engaged in it. On the other hand, to say that a horizon is the result of historically constrained local conditions is not seen as entailing that a horizon is a prison from which one may not escape, regardless of its lack of appropriateness. In the course of a developing investigation, a given horizon not only shifts, it can also become an object of reflection and evaluation. It is possible, to a degree, to reflectively discern between enabling and disabling prejudices. Accordingly, neither the dogmatism of an absolute standpoint, nor the skepticism of a locked in set of conceptual blinders is compatible with Gadamer’s understanding of horizons.

Fusion of Horizons

Communication among people is possible, according to Gadamer, only to the extent that they are able to effect a fusion of their respective horizons. It is important to understand that the fusion in view is not seen to be the result of translation into a more basic, neutral language. Gadamer is clear that, in general, no such neutral language exists, nor can exist. Rather, fusion is the result of a serious effort to engage and learn from the other by entering into and learning the other’s language through coming to an appreciation of what is at issue for the other. That is, one comes to appreciate both what the other takes for granted and what he or she takes to be in question. If necessary, such an appreciation might entail the mutual development of a new common language—a process through which the horizons of each interlocutor can be altered. Moreover, the degree of fusion of horizons

that is necessary will depend upon the practical requirements and limits of the task at hand. Perfect fusion of horizons is not necessary for adequate communication to proceed. Considerations of the context of application are essential components of the hermeneutic problem. We take the notions of horizon, the movement of horizons, the to and fro of play, fusion of horizons, and context of application to indicate dimensions fundamental to our conception of IS designers and users.

We assume that users are situated in horizons which have been conditioned by the concrete historical contingencies that constitute their own thrownness. Even more, since horizons are never fully explicit, every attempt to explicate them would presuppose a further horizon of possibilities. Thus, they cannot be fully implemented in IS. The impossibility of a full explication and computational implementation of a user's horizon is part of the reason for our view that the user and the act of using are ineradicable components of an IS. The "coming into being of meaning" of which Gadamer speaks is something that happens within the experience of the user. Accordingly, we must acknowledge the central position of human users of IS if we want to understand the actual function of those systems.

The significance of the human user is not simply that there are inevitably aspects of his/her horizon that escape formal explication. More specifically pertinent is the fact that the underlying horizon constitutes an embodied perspective on the world. Such thrownness is a fundamental aspect of the user's connectedness with the world. From one of Gadamer's key insights, we can say that rather than being merely a problem to be overcome, the user's thrownness is a key to the possibility that IS actually inform. It is only because the user has a historical location, and thus a horizon of possibilities in view, that he can discern meaning at all. For all the difficulties, conceptual and practical, that the fact of thrownness produces, the possibility of meaningful communication through IS technology requires a human horizon. Indeed, the mutual and effective use of IS technology requires a degree of fusions of horizons among the whole community of users who utilize the technology.

Play

But what are the moments of the process through which horizons are changed, fused, and evaluated? How is such fusion possible? We argue that this is achieved through a dynamic process which Heidegger (1962) described as the "hermeneutic circle." For Heidegger, this involves movement between two concerns—structuring human understanding in relation to the dimensions of analysis and synthesis (the parts and the whole). Heidegger is saying that the process of understanding involves a continual back and forth dialogue between those perspectives aimed at apprehending the whole, and those that aim at apprehending the parts. One never steps outside one's thrownness—the fact that one comes to the project of understanding with assumptions about the whole, and/or the parts. But one can, and must, reflect on those presuppositions, while keeping the object of inquiry, "the thing itself," clearly in view.

To this description of the hermeneutic process, Gadamer has added two crucial elements: application and play. First of all, he has recognized the importance of application in the hermeneutic process. Instead of conceiving the process of understanding in terms of analysis and synthesis alone, he has shown the importance of the dimension of application to that process. Understanding takes place in a context in which the concepts involved enter into some sort of practice. This requires a judgment about the implications for alternatives possible in local situations. This kind of judgment involves *phronesis*—a kind of practical prudential capacity.

Second, Gadamer has pointed to the inevitably playful, to and fro, nature of the hermeneutic process. In play, the participant is no longer trapped in a subjectivism in which the play is a kind of predicate against the participating subject. Instead, the player loses him or herself in the play, becoming, as it were, the predicate of the play. "Children play for themselves, even when they represent. And not even those games (e.g., sports) that are played before spectators are aimed at them. Indeed, contests are in danger of losing their real play character precisely by becoming shows" (Gadamer 2003, p. 109). The player's movements and decisions are constrained to conform to the regenerative, to and fro patterns of the play. We think hermeneutic play is the context in which fusion of horizons takes place. As such, along with the concern for application, play will be central for the hermeneutic process required for overcoming the problem of communication among users holding different perspectives. To be effective, IS designers must structure a context that allows users to engage in the spontaneity of mutually interpretive play.

As we will attempt to show, the Gadamerian philosophic tradition concerning horizons, play, and *phronesis*, provides admirable guidance for approaching the analysis and design of IS. This becomes especially clear in those situations where communicative breakdown has resulted from users holding differing perspectives. The value of the Gadamerian perspective will stand out most clearly when attention is shifted from the fixed structure of finished systems to the processes involved in system design and use.

Play as the Bridge between Different Views

For us, as for Gadamer, the hermeneutic activity is most centrally characterized in terms of play. Play, as Gadamer puts it, is the key to understanding hermeneutics at the (philosophical) ontological level. In terms of the clash between the Tower of Babel problem and the Newspeak solution, play is the “place” where similarities and among various perspectives are expressed and adjudicated. The difficulty pointed out by reference to the Tower of Babel problem and the Newspeak solution is that neither incommensurability of differing points of view (the source of the Tower of Babel problem), nor a common neutral framework (the goal of the Newspeak solution) are sufficient to characterize the general hermeneutic situation—the situation in which we come to adequately, if imperfectly, communicate with people who hold different perspectives. Hermeneutic play, on the other hand, allows for the recognition of difference without falling into the chaos of incommensurability, and without imposing the utopian and unrealizable requirement of a neutral common ground.

It is clear that the communicative hermeneutic system of which conflicting data models are a part must be open to the recognition of clashing inconsistency, even though the system might contain internally consistent models as proper subparts. But then how can such inconsistency avoid the notoriously chaotic consequences of logical inconsistency—namely, that anything follows? A common response to logical or mathematical inconsistency has been to eliminate the conditions (e.g., self-reference) that permit it. Thus, both Whitehead and Russell (1925) and Tarski (1941) introduced conventions prohibiting self-reference into set theory and logic, respectively, ensuring consistency and prohibiting the chaos perceived to follow from its violation. This is a procedure that has been followed in formalistic approaches to data models and IS ontologies. Unfortunately, however, this approach will not work in cases where inconsistent perspectives are being brought together in a communicative system, especially when those perspectives may be not only inconsistent with one another, but also (as we will consider below) inconsistent with the frameworks of presuppositions in terms of which they, themselves, are asserted—thus involving those who hold them in a kind of self-referential inconsistency.

The conventional restrictions on set theory and logic imposed by Whitehead and Russell and Tarski are a consequence of conceiving set theory and logic in an essentially atemporal and monological, rather than temporal and playful, dialogical context. This does not diminish the value of those conventions, given the purposes their authors had in view. Nevertheless, we consider that a convention appropriate for one sort of situation (say, the characterization of the contents of atemporal monologues) need not be applied to every other (for example, the characterization of temporally distributed, playful dialogues involving different perspectives). As long as data models and IS ontologies are construed in monological terms, consistency conditions may be imposed which would be inappropriate for the representation of dialogical interaction.

We suggest that a solution to the Tower of Babel/Newspeak dilemma may be achieved through the Gadamerian notion of hermeneutic play. With play, we think it is possible to approach the problem of integrating inconsistent perspectives into a coherent (i.e., playful) whole. Play takes place in time. It involves a temporally arranged to and fro movement among sometimes clashing points of view. But this temporal arrangement is not without order, despite possible logical inconsistency among its moments. Inconsistencies which occur at different times are not, after all, absolutely inconsistent. At the level of hermeneutic dialogue among differing perspectives, certain kinds of inconsistency are not necessarily productive of disorder. Being a function of the play, they may even be required for the processes of communication to continue in a meaningful, playful (regenerative and to and fro) way. Play may continue despite, and even because of, the absence of fused horizons. We are working toward an account of the design and use of data models and that allows for the inclusion of playfully related, inconsistent perspectives.

The Popper-Kuhn Debate

In order to demonstrate and elucidate the above possibility, we propose to examine an actual historical example: the debate between Karl Popper and Thomas Kuhn in the philosophy of science in the mid-twentieth century. The Popper-Kuhn debate is important for our purposes for several reasons. In the first place, we want to focus on the particular form of argument the protagonists employ in order to clarify the nature and role of play in the debate. The argument involved a back and forth interaction between the principals, and as such, represents the kind of temporally distributed dialogic situation IS must facilitate. Although the interaction was playful and meaningful, it involved inconsistency both between and within the interlocutors. It shows by example the reality of the kinds of hermeneutic systems somewhat abstractly described above. Second, it has been extensively recorded and analyzed from various points of view. That discussion is available to enrich our reflections on the debate. Third, by content, as well as example, it addresses many of the epistemic issues involved in communication across incommensurable paradigms.

Let us turn to a crucial exchange in the debate. To set the stage, the reader will recall the respective masterpieces, Popper's *The Logic of Scientific Discovery* (1959) and Kuhn's *The Structure of Scientific Revolutions* (1962). In his book, Popper had attempted to display the critical methodology he thought essential to science. Although he explicitly recognized the role of human judgment and convention in the evaluation of theories, a strictly logical relation between theory and data was central to his account. In certain contexts—defined by human judgment—if a theory implied observations logically inconsistent with the actual data, then, by *modus tollens*, the theory would be said to be falsified. If, again in particular contexts, the data corresponded to the predictions implied by the theory, then the theory might be said to be corroborated. Of course, Popper would not allow that the theory had been confirmed, but only corroborated. A central theme of Popper's work had been the role of data in supporting critical evaluation of theories.

Kuhn, on the other hand, had emphasized the role of cognitive psychological factors in scientific development. Most important, he emphasized the way in which a scientist's commitment to a given theory, framework, or paradigm might alter his view of the facts. In this context, the role of facts as a basis for criticizing theories is seriously affected. To the extent that facts are dependent on theories scientists hold, the facts cannot provide an independent point of reference for evaluating theories. Accordingly, Kuhn entitled his paper in his debate with Popper with a question: *Logic of Discovery or Psychology of Research?* Kuhn emphasized the role of psychology rather than logic.

The Debate

In the above context, we turn to the argument itself. Let us begin with Popper's response to Kuhn's arguments. Popper entitled his rejoinder, *Normal Science and its Dangers*. After criticizing Kuhn for not emphasizing sufficiently what Popper views as the essentially critical nature of the scientific enterprise, he states as follows:

What are his main arguments? They are not psychological or historical—they are logical: Kuhn suggests that the rationality of science presupposes the acceptance of a common framework. He suggests that rationality depends upon something like a common language and a common set of assumptions. He suggests that rational discussion, and rational criticism, is only possible if we have agreed on fundamentals. This is a widely accepted and indeed a fashionable thesis: the thesis of relativism. And it is a logical thesis. (Popper 1970, p. 56)

Popper continues:

Thus the difference between Kuhn and myself goes back, fundamentally, to logic. And so does Kuhn's whole theory. To his proposal: "Psychology rather than Logic of Discovery" we can answer: all your arguments go back to the thesis that the scientist is logically forced to accept a framework, since no rational discussion is possible between frameworks. This is a logical thesis—even though it is mistaken. (Popper 1970, p. 56)

In the above, Popper criticizes Kuhn on two points. First, he claims that Kuhn is guilty of a kind of self-contradiction. Kuhn, he asserts, argues the priority of psychology over logic, but his arguments are basically logical ones. The form of Popper's argument is to point to an inconsistency between what Kuhn claims (the priority of psychology over logic) and the fundamentally logical nature of the thesis that rationality depends on a prior framework upon which Kuhn's claim about the priority of psychology depends. Second, Popper criticizes Kuhn's view that science takes place in incommensurable paradigms on the basis of Popper's view of truth—Tarski's correspondence theory of truth. The latter presupposes an unambiguous set of facts to which statements entailed by a utopian theory would correspond. If the facts were ambiguous, as in "snow is white" is both true and false, then they could not discriminate between true and false theories. Kuhn's paradigmatic view of science suggests the facts are ambiguous because they are theory dependent, thus making falsification in the Popperian sense impossible.

Kuhn responded as follows. With respect to the charge of self-contradiction, Kuhn attempts to clarify the role of logic in scientific discussion. He holds that simple logic is sufficient to account for the compelling nature of an argument only when the situation (terms, rules, context, etc.) is unambiguous. He states:

Only if the two (participants in an argument) discover instead that they differ about the meaning or applicability of a stipulated rule, that their prior agreement does not provide a sufficient basis for proof, does the ensuing debate resemble what inevitably occurs in science. [And later,] I am dumfounded by Sir Karl's attempt to convict me of self-contradiction because I employ logical arguments myself. What might better be said is that I do not expect that, merely because my arguments are logical, they will be compelling. Sir Karl underscores

my point, not his, when he describes them as logical but mistaken, and then makes no attempt to isolate the mistake or to display its logical character. What he means is that, though my arguments are logical, he disagrees with my conclusion. Our disagreement must be about premises or the manner in which they are applied, a situation which is standard among scientists debating theory choice. When it occurs, their recourse is to persuasion as a prelude to the possibility of proof. (Kuhn 1970, p. 261)

Kuhn turns the charge of self-contradiction against Popper. It is not logic that is at stake here, according to Kuhn, but rather a disagreement about premises and their manner of application. Popper's arguments for logic are not based in logic, but in the rhetoric of persuasion. Concerning the issue of truth, and Popper's reference to Tarski's correspondence theory of truth, Kuhn has the following to say:

The semantic conception of truth is regularly epitomized in the example: "Snow is white" is true if and only if snow is white. To apply that conception in the comparison of two theories, one must therefore suppose that their proponents agree about technical equivalents of such matters of fact as whether snow is white. If that supposition were exclusively about objective observation of nature, it would present no insuperable problems, but it involves as well the assumption that the objective observers in question understand "snow is white" in the same way, a matter which may not be obvious if the sentence reads "elements combine in constant proportion by weight". Sir Karl takes for granted that the proponents of competing theories do share a neutral language adequate to the comparison of such observation reports. I am about to argue that they do not. If I am right, then "truth" may, like "proof", be a term with only intra-theoretical applications. (Kuhn 1970, p. 265)

Here Kuhn agrees that Tarski's correspondence theory entails an unambiguous world of facts. However, as a historian of science, Kuhn is quite aware that scientists working in different paradigms might assign differing meanings to the same sentences. Accordingly, Tarski's notion of truth only works well within a given paradigm. Unless one were to introduce another notion of truth—a notion not linked to Tarski's—the notion of an inter-paradigmatic definition of truth, along the lines of a correspondence theory, seems problematic.

The Hermeneutic Play of Popper and Kuhn

The structure of argument employed by both of the protagonists has been to point out an inconsistency between what one's opponent says and at least one presupposition he is believed to be required to take for granted in saying it. This is a kind of reflexive *ad hominem* argument that is possible when one's opponent is making claims that have implications for his activity when making those claims. It is important to see that being the recipient of such an argument does not entail that what one has said is incorrect. There need not, for example, be any internal inconsistency in the assertion which occasioned the *ad hominem* reply. The inconsistency does not lie there, but in the relation between the content of the assertion and some aspect of the act of asserting it (for another discussion of the role of the reflexive *ad hominem* and the Popper/Kuhn debate, see Johnstone 1959; Martin and Kleindorfer 1991).

What is interesting here is the symmetry between the arguments produced by the protagonists. Popper claims that Kuhn is arguing for a nonlogical approach to the growth of knowledge while taking for granted the logic of relativism (the assumption that rationality is relative to some framework of assumptions). Kuhn, on the other hand, claims that Popper is arguing for a logical approach to the growth of knowledge while invoking (and thus taking for granted) the psychology of persuasion. We suggest that they are both correct. Each one is asserting what the other presupposes. Their positions are complementary in the sense that each calls forth and frames the other's position. This is a manifestation of hermeneutic play. It motivates and guides the unfolding argument.

In the second place, we have seen that Popper held the world of facts to be unambiguous. This provided a foundation for his hope for a "neutral language adequate to the comparison of ... observation reports." Kuhn, on the other hand, held that the univocality of scientific language, or the facts to which such language refers, is not a general phenomenon, but exists relative to intra-paradigmatic situations. It is precisely the univocality that Popper sees that leads him to turn to logic as central to scientific growth, and it is the non-univocality that Kuhn sees that leads him to turn to persuasion and rhetoric as important for scientific growth across paradigms. The question of their theories of truth is not separable from the respective emphasis on logic or persuasion by the opponents in this debate. In short, while Popper asserts the univocality of scientific reality but presupposes its ambiguity, Kuhn asserts the ambiguity of scientific reality but presupposes its univocality (for a discussion of this conclusion in a somewhat different context, see Martin and Kleindorfer 1991). Although this symmetry is replete with inconsistency, it does

not necessarily entail the incoherence sometimes expected of inconsistency. If their positions were simple, the argument would not have moved beyond merely stating an opposition: dogmatism versus skepticism. Instead, however, the argument they engaged in became playful, instructive, and interesting.

Their difference is one of horizon—the issue that is being addressed (what is being denied as well as what is affirmed). Popper is viewing the common epistemic situation as in contrast with the presupposition of ambiguity, while Kuhn views it as contrasting with the presupposition of univocality. The play thus constrains Popper to continually distinguish the epistemic situation from ambiguity and Kuhn to continually distinguish it from univocality.

Moreover, the inconsistency of the two positions entails that fusion of horizons does not, indeed cannot, take place. Ironically, it is their failure to fuse horizons that motivates and shapes their play. This failure is, in part, the consequence of the interlocutors not fully appreciating the full complementarity and mutual requiredness of their position. Fusion of horizons, and the corresponding end of the play, would involve the mutual transcendence of both positions. In this case, fusion of horizons would not involve each merely appreciating the position of the other. Instead, it would require each to drop his/her own position, not in favor of the others', but in favor of an understanding of the complementarity and mutual requiredness of both of the positions in question.

We take it that we have shown through our analysis of the above example that the structural coherence of hermeneutic play is not eliminated because it includes inconsistent moments. However, from a Gadamerian perspective, there is a fundamental incompleteness in the example. It is that the Popper/Kuhn debate was not explicitly focused on the problem of application—a dimension Gadamer held to be central to the hermeneutic process, in general, and fusion of horizons, in particular. In the next section, we take up the issue of application, incorporating it into the notion of play, and spell out some implications of this expanded conception of hermeneutic play for the practice of IS design.

Application and Phronesis as Constraints on IS Design: The Role of IS Designers in Organizational Guidance

It is through the process of application that the abstract philosophic debate described above is relevant to the real life situation of IS designers and users. In order to see how the problem of application relates to hermeneutic play, let us reflect on the relation of practice to the clashing epistemic interests described above. Consider, for example, a database concerning deforestation in the Brazilian rain forest or global warming. A Newspeak policy may be favored by those who want to control the conversation by limiting the allowable data. On the other hand, the introduction of a confusing multiplicity of contradictory perspectives may be favored by those who wish to deflect the significance of an important empirical discovery or theoretical argument. It is in these sorts of pragmatic situations that the apparently abstract epistemic questions of incommensurability really take on practical importance.

The foregoing may suggest that every attempt to control the database by limiting possibilities or by expanding them is invalid. The terms we have been using, Newspeak and Tower of Babel problem, would indicate a negative evaluation. But this suggestion would not be quite right. Drawing again on the philosophy of science literature, there is general agreement that there is a time to appropriately cut off discussion. In a famous passage in *The Logic of Scientific Discovery*, Popper argues that establishing the empirical basis for a scientific testing of theories does not involve the observation of positivistically verifiable facts, but an act of judgment—a decision that a community of scholars may make, to agree on the facts for the time being. Like piles in a swamp which can provide a basis for building without ever touching bedrock, such “facts” can constitute a provisional conventional foundation for theory testing, but not an absolutely unchangeable one. Similarly, Kuhn argues concerning the closed nature of paradigms that the “facts” seen by scientists are selected in terms of the theoretical paradigms they hold. Both Popper and Kuhn would agree that there are times when limiting questioning by imposing something like a constraint on language or categories is essential for scientific progress. Likewise, it is the prerogative of the directors of an organization to guide it, and there are few more effective ways to guide than to set the categories and language in terms of which members of the organization address their worlds. Therefore, a strategy to simplify by shutting down discussion about one or another aspect of the world can be an essential element of important kinds of scientific or organizational progress. Recalling that horizons are defined through specification of what is taken for granted and what is taken as open possibility, this stipulation of what is to be taken for granted would partially define an organizational or communal horizon. The difference between Newspeak as a convention and a Popperian or Kuhnian convention would be in the quality of judgment that led to the convention—the degree of appropriateness given the values of the organization and its members.

However, there are also times when it may be appropriate to open up discussion. In such situations, assumptions concerning the “facts” may be subject to radical questioning. Popper and Kuhn would agree about the appropriateness of such a strategy under certain conditions, although they would certainly disagree about what those conditions might be. In a more extreme vein, Feyerabend (1978) argues for a strategy of maximal openness, aimed at making the weaker argument stronger and promoting the growth of the whole. Openness to incommensurable alternatives is a strategy that must be available to those responsible to guide an organization or a scientific community. This, too, as a specification of what is possible, would be a partial definition of an organizational or common horizon. Again, the distinction between a chaotic Tower of Babel and a selected set of seriously-to-be-considered alternatives would consist in the quality of the judgment that led to the specification of what is open for consideration.

By opening or closing the range of possibilities to which an IS is responsive, an IS designer would be changing the horizon of the organization. There, the decision to shut down or to open up discussion would itself be a matter of judgment and would not only depend on epistemic considerations (e.g., the nature of truth, objectivism versus relativism, etc.). It would also depend on the values of the organization (e.g., survival, profit, a meaningful work environment, or ecological concerns) and what are conceived as the cost-benefit trade-offs resulting from the effort to realize such values in the same organization more or less simultaneously. So any hope for a final fusion of horizons and an end of play would be in vain. As the situation of the organization fluctuates, the horizon will shift as play between openness and closedness on various dimensions of concern continues.

The category of *phronesis*, introduced by Gadamer to characterize the hermeneutical task of application, naturally describes the sort of negotiative judgment between openness and closedness we have in mind here. *Phronesis* is a mode of understanding, which is, as Gadamer (2003) says, “a special case of applying something universal to a particular situation” (p. 278). Gadamer borrows the concept of *phronesis* from Aristotle to describe the process of application. Practical knowledge, or *phronesis*, is a special kind of knowledge, in contrast with *techne* and *episteme*. *Phronesis* is knowledge directed toward a concrete situation, while *episteme* is

scientific knowledge, knowledge of what is universal, of what exists invariably. *Techne* can be learned and forgotten, while ethical reasons cannot. The practical knowledge that arises through *phronesis* cannot be understood by itself. Instead, it must not be “detached from a being that is becoming” but it is “determined by it and determinative of it. (Gadamer 2003, p. 312)

The introduction of the ethical dimension at this point enables us to raise some important questions about the way in which IS designers enter into, and must take responsibility for, the control and guidance of organizations. What is the role of IS designers in this process? Is that role to passively translate the concerns of upper level management into the structuring of the IS, designing it to be open and closed in ways that will direct the organization—once it becomes clearer how management concerns might be facilitated by IS design? Or do designers have a responsibility to assume a degree of independence having also a stake in the organization and its destiny? If so, with what values should they be concerned that the organization realize? These considerations move IS design from a purely technical enterprise to one that is central to the internal and external politics (using this term in a positive sense) of the organization.

We think Capurro (1996) is making a related point when he says that “in order to assume ethical responsibility, scientists and engineers have to overcome silence, i.e., they have to speak in public about values.” Floyd (1992), cited in Capurro, states that

an important aspect of computer science is that it deals with creating reality: the technical reality of the programs executed on the computer, and the conditions for the human reality which unfolds around the computer in use. Therefore, the conceptual categories “true” and “false” it relies on are not sufficient in themselves. We have to go beyond them by finding categories for expressing the felicity of our choices, for distinguishing “more or less desirable” as we proceed in making distinctions and decisions in communal design processes. (p. 20)

Human activity takes place in a context of values and meanings whose implementation and communication is the purpose of information systems (Winograd and Flores 1986). Our contribution here is a complement to the work of Winograd and Flores, Capurro, Floyd, and others in emphasizing the role of IS in the guidance of organizations and the active role that data modelers play, or ought to play, in it. According to our view, the control of data models involves the control of horizons as a function of the *phronesis* of those responsible for organizational guidance.

Conclusions

In this paper, we dealt with a common problem that a data modeler faces within an organization: the coexistence of different interpretations of a given reality that need to be modeled in an IS. Usually the modeler has two options: either create an enterprise-wide data model or live with a multiplicity of (incommensurable) models. We called the former the Newspeak solution. The application of the latter would result in the Tower of Babel problem. We took the hermeneutics of Heidegger and Gadamer as a point of departure for analyzing and overcoming this either/or dilemma. We showed how the hermeneutic concept of play can be seen as the place where differences and similarities among various perspectives are expressed and discussed. We used the concepts of horizon, fusion of horizons, play, the hermeneutic circle, and phronesis to show the hermeneutic nature of IS. We demonstrated the structure of hermeneutical play through a historical example—the Popper/Kuhn debate in the philosophy of science. In their debate, Popper and Kuhn held interlocking complementary positions in which each asserted what the other presupposed (i.e., aspects of his interlocutor’s horizon). We showed how this situation informed their hermeneutic play. We completed our Gadamerian analysis of IS by pointing to the role of application and phronesis in framing the play between what is taken for granted and what is open for question in the definition of organizational horizons. We also highlighted some ethical implications of our analysis for the activity of data modeling.

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