

The notion of diagrammatic expression in interpretive IS research

Takeshi Kosaka

School of Management, Tokyo University of Science
500 Shimokiyoku, Kuki, Saitama 346-8516, Japan
kosaka@ms.kuki.tus.ac.jp

Abstract

Empirical IS research has generated inconsistent findings on hypothesized IT impact on organizations. Upon reflecting on this problem, interpretivism emerged in IS research. However there is no data showing the increased reference by IS practitioners to interpretive research papers. It is still difficult for researchers to produce interpretive papers because of no specific tools, and it is not an easy task for busy IS practitioners to read the interpretive papers which are text-centered. There is also a structural problem that papers not used by practitioners continue to be produced by researchers. Meanwhile cognitive research intensively revealed the effectiveness of diagrammatic expression in problem solving and finding in the 1990s. We examine the notion of diagrammatic expression in both IS research and use activities, and suggest that the use of diagrammatic expression moderates the structural problem. With the discussion we open up an avenue to the development and use of diagrams as a research topic in interpretive IS research.

Keywords:

interpretive research, information systems, diagrammatic expression, activity theory

Introduction

There is a growing concerns for interpretivism in IS. What emerged through the advent of interpretivism is the importance of a text in the place of a formal proposition as a universal knowledge. As the text is usually so long and complex, it is thought that interpretive papers are not directed toward practitioners but toward future reflective practitioners who are currently students (Lyytinen, 1999). As a result, IS research papers remain unused by IS practitioners.

At the same time, it is difficult for most of IS researchers to produce texts solely based on phenomenology, hermeneutics and critical theory. It is further proposed that having multiple philosophical perspectives is an appropriate attitude of interpretive researchers to gain an understanding of social reality (Mingers, 2001). It can be thought that there are high hurdles for inexperienced researchers to enter the interpretive IS research field.

Recently in cognitive science there has been intensive studies showing the effectiveness of diagrammatic expression in problem solving and finding. We argue that diagrammatic expression as a tool has some potential to improve these situations in interpretive IS research.

The interpretivism we take up in this paper is dialectical or critical hermeneutics (Myers, 1995). It is a discipline that integrates hermeneutics with critical theory. Research methodologies used in it are primarily ethnography and case study.

There are prior researches on ethnography and case study. However, they remain at the level of principles, not coming up with specific methods or tools that can be used in sensitizing

situations and producing texts. The discussion of diagrammatic expression in particular is not found in prior research.

The next section shows the individual difficulties in researchers' producing texts and practitioners' reading the texts. Then we will discuss the notion of a tool to moderate these individual difficulties, and then reveal inter-related structural problems between the researchers and the practitioners with the aid of Activity Theory. Then we will review the capabilities of diagrammatic expression in problem solving and finding shown by recent cognitive science. Finally, we will introduce the notion of diagrammatic expression as a tool to the interpretive IS research field, and show it has a potential to moderate the individual difficulties and further resolve the inter-related structural problems.

Individual surface problems

Klein and Myers (1999) articulated a set of principles for interpretive IS research, which are a guide for researchers to understand the basic thought of interpretive study. However there still remain difficulties for researchers to make specific researches and for IS practitioners to utilize the research results. Below are individual difficulties or problems from IS practitioners and researchers respectively.

Managers are known as people whose time is segmented and who can not have solid blocks of time for study. Articles that tend to be read by them are those that are shorter, use more exhibits, use everyday language, have more contextual description and have more prescriptions (Benbasat and Zmud, 1999). By contrast interpretive papers are usually so long and complex a text that they are not approachable for the managers and IS practitioners.

For researchers the research environment of interpretive study has been developing in both perspectives and principles. For a basic perspective, it is made clear what dialectical hermeneutics is in IS research. Myers (1995) showed that the primary focus is totality of meanings, social reality, and intended and unintended results, and that the descriptions are interpretive and critical, subjective and objective, and historical. Klein and Myers (1999) articulated a set of principles for conducting interpretive studies, where a hermeneutic circle is the fundamental principle and there are six more specific principles.

The perspective and the principles are comparable to physics in Science, and are not on the level of engineering. As Klein and Myers (1999) point out that the application of the principles requires considerable creative thought, the principles do not reach the level of a tool with which most of researchers can readily begin specific researches. For people with less experience, it is not an approachable task to utilize them. Such a situation and a difficulty are pointed out by Lyytinen (1999), who says that *"My experience shows that it takes at least three to five years to do anything, which can make a difference in practice. Thus, anything that really addresses relevant concerns is beyond the scope of a single Ph.D. study."*

Needs for tools

In this paper we propose the notion of diagrammatic expression as a tool in interpretive research. Humans use a tool to recognize or transform an object. Kuutti (1996) says that *"The tool empowers the subject in the transformation process with the historically collected experience and skill 'crystallized' to it."* Tools also have a role of helping a human to control his or her behavior. There are instruments as well as concepts or models as a tool.

There are no specific tools in interpretive IS research at present. In dialectical hermeneutics, the object of study is very broad as shown by Myers (1995). Some theories are available here

including Structuration theory, Actor-Network Theory, and Activity Theory. For many researchers they are not a approachable tool, rather they are simply a theory. What is needed here is the development of a tool that is comparable to the engineering level.

The product of interpretive research is a text, from which readers have to frame a context for understanding. For busy IS practitioners with many interruptions it is not an easy task to understand the text in a bunch of small blocks of time, because the text is usually so long with a variety of perspectives that it requires readers to practice very careful reading.

There is also a study reporting that, in a world with interruptions, a text with graphs supports knowledge workers working on complex symbolic problems more effectively than a text only does (Speier et al., 1997).

We have to remind of the social reality and history of the IS development where practitioners have been using a variety of diagrams. IS practitioners should be able to understand a text more efficiently and effectively if the text is also diagrammatically represented.

Structural problems between the production and the consumption

We will make it clear that there is also a structural gap between the production and the consumption, which is a problem that does not accept an easy solution. Here we will capture the problems by using a diagrammatic framework in Activity Theory (Engeström, 1999).

Activity Theory is primarily based on an idea that the relation between an actor and the object is not direct but mediated by a tool, and places an individual action within an activity practiced by a community which shares the same object (fig.1). Two additional relationships are formed: subject-community and community-object. They are also mediated, the former being the rules concerned with outcome distribution and the later being division of labor.

The first activity we will discuss is one practiced by the community of researchers. The tools currently applied in interpretive research are phenomenology, hermeneutics and critical theory, and also a set of principles based on these disciplines. The outcome is a text. A researcher is evaluated by the publication of his or her research outcome among the research community (distribution rule). Not only the object of a paper must belong to the object domain of the community, but also the production manner of the paper must conform to the customs shared by the community (division of labor).

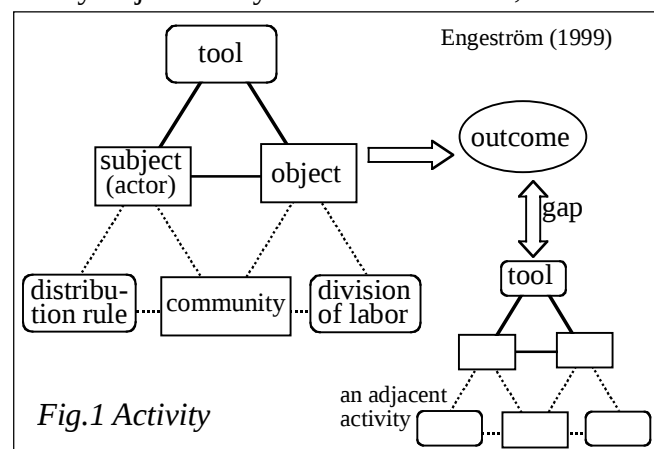


Fig.1 Activity

These three mediations control researcher's actions. Thus an action of a researcher is forced to conform to the distribution rules and the division of labor reproduced by the community. As a result, the action continues to result in the production of a text-centered paper.

The second one is an activity of busy IS practitioners. Tools used in IS development activity belong to an engineering methodology, that are approachable prescriptions. The size of most IS is large at present so that the division of labor is practiced. Development is usually performed function by function. As a result, the context on which IS will be placed in the future is destined to be considered less important than the functions being developed. The

evaluation of project members is usually made at the end of each phase prior to the end of the project as a whole. It means that the evaluation is performed based on short-term outcomes (distribution rule). As a result a short-term practice continues to be reproduced.

As a result knowledge used in practice is not the outcome of IS interpretive researches but prescriptions and drawings which include little contextual information, while knowledge produced by researchers continues to be text-centered. Therefore, a gap continues to be between the production and the consumption. This situation emerges because of the different strategies adopted by both communities for their survivals, it being an unintended consequence.

The significance of diagrammatic expression as a tool

In this section we will discuss the significance of diagrammatic expression, as a tool, which supplements a text and mitigates the problems mentioned above. Recent cognitive science has revealed the several characteristics of diagrammatic expression: compactness, locality, emergent property and specificity. For detail see papers (Larkin and Simon, 1987; Suwa, 1999; Yamazaki and Miwa, 2001). Reduction in cognitive load has been often emphasized as the main effect of diagrams. However, since the 1990s, the effectiveness in problem solving and finding has been also examined. Based on these findings we will argue the notion of diagrammatic expression in interpretive research production and consumption.

The emergent property means that a big picture can be inferred from a diagrammatic disposition of parts and then the big picture can support the re-interpretation of the parts. It is the hermeneutic circle so that diagrammatic expression can be regarded as a facilitator of the hermeneutic circle. There are a few points that are considered the utility of diagrammatic expression to facilitate the hermeneutic circle. One is that a human goes through a process where he finds a new aspect of a problem by drawing his inspiration from the diagrams while he is illustrating them (Suwa, 1999). Another is that diagrammatic expression as an externalization resource of internal ideas helps to find new solutions by facilitating the reflection on his own thought and experience (Yamazaki and Miwa, 2001). In short these points suggest that the hermeneutic circle with the aid of diagrams are more effective than that without it. Thus, research works can be supported by the use of diagrammatic expression.

We can expect diagrammatic expression to reduce reader's cognitive load. IS practitioners can not avoid interruptions. The fact that diagrammatic expression moderates the interruptions as pointed out by Speier et al. (1997) exemplifies an aspect of the reduction of cognitive load. A practitioner does not merely accept the self-understanding of writers, but tries to seek total meanings that are suggestive to the improvement of his or her own situation. It means that there is a dialect between the text and the reader. Diagrams prepared by researchers can show a whole and their parts in a visual way on a figure. They are considered not only to reduce the cognitive load of the reader but also to facilitate the hermeneutic circle.

Diagrams accompanying a text will have a role of facilitating the reading of the text. Thus the employment of diagrams in production is expected to moderate the structural problems between the researchers and the practitioners. Due to little prior research on diagrammatic expression on IS interpretive study, the development and use of diagrams are considered worth a research topic in IS interpretive research.

Discussion

In a positivistic term we have presented a hypothesis that diagrammatic expression in general

is an effective tool in supporting both the text writing in interpretive IS research and the text reading. There is a need to develop concrete diagrams and test the hypothesis with them. As we have shown the need and effectiveness of diagrammatic expression in general, we would like to suggest three generic types of possible diagrams for future research.

Actant Rhizome Diagram: To capture a relation among actors and non-actors at a particular time over the trajectory of a social reality. For this type of diagrams, a basic idea may be provided by Actor-Network Theory.

Trajectory Diagram: To capture a trajectory of a social reality during a certain period. For example, Kosaka and Suzuki (1999) propose a diagrammatic framework based on Giddens' Structuration Theory and Bourdieu's sociology of class.

Activity Diagram: To capture a timeless relation. For this type of diagrams, a basic framework (fig.1) can be provided by Activity Theory, with which we depicted structural problems among adjacent activities, research and IS implementation, in this paper.

We have discussed the potential of diagrammatic expression in supporting the interpretive IS research and the text reading. Our discussion is still conceptual. The effectiveness in the interpretive IS research needs empirical test.

References

- Benbasat, I., and Zmud, R. W., "Empirical Research in Information Systems: The Practice of Relevance," *MIS Quarterly*, Vol.23, No.1, 1999, pp.3-16.
- Engeström, Y. *Learning by Expanding: An Activity Theoretical Approach to Developmental Research*, Shinyousha, 1999, in Japanese translation.
- Klein, H.K., and Myers, M.D., "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems," *MIS Quarterly*, Vol.23, No.1, 1999, pp.67-94.
- Kosaka, T. and Suzuki, S., "Discourse Gives Way to Situated Actions," *Proceedings of the 11th Australasian Conference on Information Systems*, 2000.
- Kuutti, K., "Activity Theory as a Potential Framework for Human-Computer Interaction Research," in *Context and Consciousness*, B. A. Nardi (ed.), 1996, pp.17-44.
- Larkin, J. H. and Simon, H. A., "Why a Diagram is (Sometimes) Worth Ten Thousand Words," *Cognitive Science*, Vol.11, 1987, pp.65-99.
- Lyytinen, K., "Empirical Research in Information Systems: On the Relevance of Practice in Thinking of IS Research," *MIS Quarterly*, Vol.23, No.1, 1999, pp.25-26.
- Mingers, J., "Combining IS Research Methods: Towards a Pluralist Methodology," *Information Systems Research*, Vol.12, No.3, 2001, pp.240-259.
- Myers, M. D., "Dialectical Hermeneutics: A Theoretical Framework for the Implementation of Information Systems," *Information Systems Journal*, Vol.5, No.1, 1995, pp.51-70.
- Speier, C. et al., "The Effects of Task Interruption and Information Presentation on Individual Decision Making," *Proceedings of the 18th ICIS*, 1997, pp.21-35.
- Suwa, M., "Visual Displays as Stimuli to Cognitive Processes," *The Journal of the Visualization Society of Japan*, Vol.19, No.72, 1999, pp.13-18 in Japanese.
- Yamazaki, O. et al., "A Study of Changes of Problems Solving Processes by Externalization," *The Journal of Japanese Cognitive Science Society*, Vol.8, No.1, 2001, pp.1-14.