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Abstract

The previous decade has been well known in Australia for the methodological wars. This culminated in a modest increase in interpretivist research. However, critical theory and postmodernist methodologies have not been taken up with any great enthusiasm both here in Australia or elsewhere. This paper attempts to outline the practical and historical reasons and the theoretical difficulties for the failure of these paradigms in contemporary IS. Secondly, it attempts to identify why IS must embrace these paradigms for the future, and the emerging postmodernist approaches in particular, in the light of the rise of ubiquitous information systems. The paper proposes a new set of research questions for the discipline.

Keywords

Methodological approaches, critical theory, postmodernism, sociomateriality, history of IS

INTRODUCTION

The reader will all be well familiar with the methodology wars of the previous decade. These wars, declared over (Weber, 2004), have resulted in the incorporation of qualitative, interpretivist work in the most prestigious journals and indeed the establishment of the Information Systems Journal (ISJ) specifically as an outlet for interpretive work (Avison and Elliot, 2006). Although few studies have investigated research paradigms and methodologies within the discipline (Chen and Hirschheim, 2004), the available evidence does suggest an increasing level of methodological and research pluralism (Keller and Coulthard, 2010).

One of the first studies to investigate the methodological assumptions underpinning research published in IS journals was undertaken by Orlikowski and Baroudi (1991). They found that between 1985 and 1989 of the 155 IS articles published in four top US publications, 96.8% were based on the positivist tradition and only 3.2% were interpretive. Looking at research published a decade later (between 1995-1999) in five top US journals, Vessey, Ramesh and Glass (2002) concluded not much had changed. Their findings showed that only 4.7% of the studies were interpretive. Neither Orlikowski and Baroudi (1991) nor Vessey et al. (2002) identified any critical and postmodern studies. However, a much broader study, which evaluated 1,893 articles published in four top European journals as well as four US outlets between 1991 and 2001, showed that overall 19% of published research in these top IS outlets took an interpretive approach (Chen and Hirschheim, 2004). A decade on, during the period 2001 to 2009, Keller and Coulthard (2010) found that of 736 research papers published in three flagship journals of the US, Europe and Australasia (MISQ, EJIS and AJIS respectively) that overall interpretive studies accounted for approximately 31% of the publications, positivist studies 60%, critical studies 2.4% and postmodern studies a tiny 0.5%. Making comparisons across these types of studies is difficult because of different study approaches, categorisations, and journals investigated. Nevertheless, it appears clear that IS as a discipline has slowly moved from an almost exclusively positivist focus to include interpretivism. However, critical and postmodern studies have barely made an impact.

Information Systems is an area of study and application that draws on theories from a number of foundation disciplines including technical areas such as computer science and database management on one side, to social science areas such as management, organisational studies, sociology and psychology on the other. Given the importance and visibility of critical and postmodern studies in the social sciences (Gergen, 1994), it seems astounding that these types of studies have made so few inroads into IS. In this paper, we identify and outline the reasons for this lacuna, and begin to identify the major theoretical directions and implications for the discipline.

To accomplish this goal we first look at the genesis of IS as an instrumental discipline. Next, we discuss the modernist underpinnings of IS and then briefly consider the rise of the information age. We then turn to consider critical and postmodern perspectives as a means of studying information systems of the information age in order to identify the key research questions for IS.

IS AS AN INSTRUMENTAL DISCIPLINE

Information Systems is a relatively young discipline and there is fairly broad consensus that the stimulus for its emergence was the application of computers to process data during the 1950's (Avison and Elliot, 2006). However, it was not until the mid 60's when computerised information systems made their way into mainstream business that IS Schools and a scholarly community began to take off in earnest (Clarke, 2008).

The impetus for the emergence of the discipline was the automated processing of data made possible by new computer technology. Therefore, it is not surprising that the emerging discipline would draw on both existing and budding disciplines and professions which had an interest in data and its processing, and in new uses for electronic computers (Clarke, 2008). These disciplines included Operations Research (or Management Science), Computer Science, and Organizational Science (Claver, Gonzalez and Llopis, 2000). This background is important in understanding the research origins of the discipline since researchers naturally brought their own primarily positivist, modernist research traditions into IS.

To abstract decades of developments and concerns in a field is an impossible task, but it would not be too wild a generalisation to say that there were two main preoccupations during this foundational period. These were firstly the use of data to support both business operations and the 'rational' management of business, and secondly a technical focus concerned with solving the problems of creating systems to achieve these goals (Davis, 2006).

The focus on technical concerns had a pragmatic origin. The acquisition of computers by businesses and government fuelled an urgent need for software at a time when there was a lack of expertise in developing business software. From 1967 to the mid-80's, a significant amount of research effort was directed into determining and codifying how to analyse, design and implement business software in a more effective way (Clarke, 2008).

The business management concerns centred firstly on the efficient and effective processing of data prompted by "the insidious growth of paper work, and rising office costs" (Laver, 1964:93). However, as early as 1958, the potential for systems to more directly assist organisations in managing their businesses was recognised "... there is more to be gained in providing management with information to enable them to make their businesses more efficient than in merely economizing on existing clerical costs." (Caminer, 1958:13). So while the first problems information systems were designed to tackle were data processing ones, demand soon grow for management information systems (MIS) and decision support systems (DSS).

It is hardly surprising that given the disciplines from which early researchers originated, that the predominant view of technology effects was the unproblematic notion that introducing computers would lead to defined outcomes. However, early systems were plagued with problems including a basic lack of understanding of how to design MIS and DSS systems in ways that actually added value to managers (Ackoff, 1967). In a scathing attack on the field, Dearden (1972:96) declared "…computer-based information systems have been oversold, management has been led to expect more than it has received". Criticisms such as this, led to a growing recognition in the 70's that "behavioural issues" played a part in the success or otherwise of systems and there were calls for a "full program of research [that] would seek to test the interaction effects of all possible combinations of these variables" (Mason and Mitroff, 1973). The focus of this stream of research was the search for independent variables that could explain differences in efficiency and effectiveness.

The early history of IS then concerns making IT and IS systems work, and not only making them work but also making them work effectively and efficiently. This was usually for business applications. Business after all was the main user of IS. This is not to say that such mechanistic reductionist approaches were the only views in IS but there were certainly the dominant ones especially in the US (Benbasat and Weber, 1996; Clarke, 2008). In the UK and later in Scandinavia, the London Tavistock Institute's work on socio-technical systems was influential and found expression in work such as Mumford and Banks (1967) and Bjorn-Andersen and Hedberg (1977). However, such work represented only a small stream, and was still focussed on IS and business efficiency.

While arguably technical concerns have moved to the periphery of IS (Clarke 2008), the instrumental focus is still the predominant focus. In a recent study of research published between 2001 to 2009 in EJIS, AJIS, and MISQ Keller and Coulthard, (2010) show that overall 47% of articles published in this period had an instrumental focus while papers with a technical focus accounted for only 7% of the papers overall. As an instrumental discipline, when it has not been involved in purely technical issues, it has been involved in making business more effective and it comes as no surprise that in academia the IS discipline has traditionally been placed in either business faculties or IT/science faculties. Underpinning this instrumentalism is the more general Western worldview of modernism: that by understanding the world it can be controlled and improved.

IS AS A MODERNIST DISCIPLINE

The idealism in IS can be seen in the belief of a technological and sociotechnical fix and the force of progress. IS has faith that the application of its reason and science will improve things. We believe our expert knowledge and

technologies can be applied to make a better world, a better system. Bad outcomes are seen as a result of failures of implementation or exogenous to the system rather than intrinsic to the nature of change and the limitations of the human condition. This is modernism (Bauman, 1989).

Modernism's underpinning philosophy is Cartesian dualism. This is the split between the subject and object, mind and body. The mind takes in the world, cogitates on the world, applies reason and gives a response or finds a solution. The mind is autonomous and individual. It is also disembodied in the sense that the mind is not part of the body. It is an entity curiously cut off from the world and god-like above the world. The body and all other things are objects very much in the world that can be studied using the techniques of science. Objects exist and act in time and in three-dimensional space. Such objects act according to cause and effect relations that can be observed and nomothetic generalisations, natural laws developed. A further separation is the separation of morality from science. Science investigates what is, rather than what ought to be. Moral ends are not scientific concerns. Our concern is to apply our expert knowledge and build a better information system where better can only mean more effective or more efficient and doing what its owners or other authorities intend.

The key philosophical question in this Cartesian framework is one of epistemology. How does one know the truth? How does the mind know in the face of radical doubt? By removing the mind from the world its connection to the world becomes problematic. The answer is that of representationalism whereby what we perceive in the world corresponds with or maps onto language. That is to say we represent the world in our mind in a similar way to how we in IS map the world into our models and computer ontologies.

Modernism in Information Systems like all science has taken the path of empiricism and by the careful observation and taking in of the facts of the world we can infer how the world is. Positivism takes its cue from this. Interpretivism does also, however in this case, the physical world - the world of science, is even further divorced from the world of mind where the mind acts according to its understandings or perspectives on the world rather than to the nomothetic laws observed in the natural world.

At almost every point, modernism has come under a withering and sustained attack in the 20th C not only in theory but in our everyday hopes and dreams (Harvey, 1990; Rose, 1996). The optimism and promised progress did more than fade in the light of the French terror, the Holocaust, Stalin's gulag's, the threat of nuclear war and environmental devastation. Bauman (1989) has strongly argued the links between the big ideas of a better world coupled with bureaucratic and technical proficiency, two central aspects of modernity, were deeply implicated in the Holocaust. As Lyotard (1984) famously observed: there is now an 'incredulity toward the metanarrative'. By metanarrative he meant the narratives of progress and science. This is postmodernism. Before turning to the criticisms of modernism and postmodern approaches, we first turn to describing the current situation of Information Systems in the information age.

IS IN THE INFORMATION AGE

It seems odd, even paradoxical, that Information Systems as a discipline is not thriving in the information age (George, 2005). Everything is about information, interactivity and ubiquitous computing yet our discipline seems to be shrinking. The reason may be quite similar to what happened to ecommerce, where the 'e' returned to the fifth letter of commerce. In the information age, everyone is interested in information. Information Technology has indeed become ubiquitous or as Carr (2003) suggested, a commodity. Peter Keen a few years ago at Bled rhetorically asked the audience what was the most important programming language: English was his response. He was not trying to make a point about the advance of computing languages but that facility with English – the common language of the internet, information and commerce – was what counted, not technical ability.

Information Systems seems to have been slow to realise this and also the fact that the computer had escaped the boundaries of organisations and the business world (Yoo, 2010). Information Systems is in the world and is no longer simply making better mousetraps and clever customer and employee relationship management software but is about ubiquitous cloud computing and interactive information – Google, Web 2.0 and beyond, and where computing and information is embedded in everyday artefacts. This is changing not only business but our social worlds, our knowledge of the world, our interaction with others and our private identities. The information age is an age of digital natives in ubiquitous information systems (Vodanovich, Sundaram and Myers, 2010).

To this end, we need a theory or a research perspective beyond that of TAM and DOI and other theories that view technology as exceptional, as an impingement on our lives as opposed to part of our lives (Orlikowski, 2007). Orlikowski and Scott (2008:438) characterise the dominant research stream of IS as viewing technology, humans and organisations as being 'discrete, independent entities with inherent characteristics'. This is essentially Newtonian and modernist. It is a world with things moving in space and almost begs for a nomothetic law that explains each of these entities and their kinematic interaction and determination. This is a view of the world from without rather than a world from within. It isn't surprising that much of IS has been positivist from this viewpoint.

Something closer to the view of developing a theory that incorporates technology as everyday experience (Yoo, 2010) suggests we need a theory that is part of our everyday experience or what Orlikowski and Scott (2008) typify as 'mutually dependent ensembles'. Here, the world is not mechanical but one in which technology, information systems, organisations and humans are interdependent. Collapsing this down, the problematic is one of our relations between information systems, technology and people. Such a relational view does provide a better perspective on our everyday experience and one in which interpretivism in its identification of human understandings can prosper. This may account in part for the modest growth in interpretivism as our research moves towards human experience of and with computing.

However, just as IS found interpretivism, the very notion of the human subject has come under sustained postmodernism critique (Foucault, 2002; Rose, 1996). Following the computer out of business may mean following it into postmodern and critical theory. Firstly because they may well identify the plexus between humans and technology but also because postmodernism and critical theories are major theories in the social sciences outside IS. It allows us to converse with and draw from these disciplines.

The world of and around Information Systems has changed. Business data processing and software development is now routine. Bespoke software development has largely given way to customisable off-the-shelf software, and most significantly computers have moved out of business and the distinction between our work and our lives is becoming more and more blurred. This is not to say that IS research has not begun to examine these new social phenomena. Indeed, the study by Keller and Coulthard (2010), found that research with a social focus had grown from 32% during 2001-2003 to 41% overall in 2007-2009, across the three journals MISQ, EJIS and AJIS. The gains appear to be at the expense of research with an instrumental focus. What is missing in IS, however, are new theories for conceptualising this vastly different world. Thus the social science foundation disciplines become more important. These are largely postmodern now (Gergen, 1994).

POSTMODERNISM, CRITICAL THEORY AND IS

Not surprisingly, as computing and information systems have come out of the business world, other disciplines have become more interested in information technology. Such interests range from sociologies of technology, librarianship, law and media. Such areas are either postmodern or critical or are well versed in such perspectives. As Gergen (1994) dryly observed about psychology in 1994, there will be nobody to talk to and no interdisciplinary studies would be possible and the discipline would be a small and isolated modernist island.

Critical theory does not of course sit easily within a business and instrumentalist perspective and it is likely that it has been one key reason that critical theory has been largely missing from IS. Academics generally but critical theory in particular is always in danger of biting the hand that potentially will feed it. Critical theory is interested in change and a better world and identifies with the Enlightenment. However, rather than seeing simply customs and superstitions as impediments to a better world, critical theorists see those in power, our social and material relations and the 'ruling ideas' as the chief barriers to a better world.

Critical theory in the social sciences refers to the (neo)Marxist approach that emerged from the Frankfurt school in the 1930s. Critical theory draws on Marx to argue that the pivotal moment of science and rationality was not simply to understand the world but to change it. Critical theory's relationship to the Enlightenment is complex. It criticises the instrumental rationality of the Enlightenment and modernism but retains and places in the centre of its critique the emancipatory values of the Enlightenment. In doing so, critical theory attempts to avoid the relativism of postmodernist and historicist approaches.

Critical IS is concerned with how inequality changes as a result of information technology change. The principal questions are: How are employees, citizens and the disadvantaged (or even the environment) generally affected by information systems and technological change on the one hand and how can they utilise information systems for empowerment? How do information systems facilitate or oppose and undermine the deadening moral effect of instrumental rationality? Critical theory is at the service of these questions.

Postmodernism as we have seen, does not generally share this confidence. Foucault (1984) argued however that his work was part of the Enlightenment project as he was attempting to increase the envelope of possible thought. Arguably, postmodernism's greatest theoretical achievements have been not simply the critique of Cartesianism and modernism but the decentring of the subject and totalisation.

The decentring of the humanist subject refers to the concept that firstly the human subject is not prior to experience but is formed through experience and secondly, as a corollary insofar as our experience of the world is partial, fragmentary and incomplete, so is the subject. The autonomous subject of the Enlightenment has fallen and our 'decentring' removes us from the centre of discernment. Because the subject is not prior to experience it is in itself derivative and not ontologically prior to experience but we are produced through experience. Indeed, the subject is produced through its enactment/instantiation/performativity. What are called the totalising forces fare little better and postmodernists generally accept the subjectivist critique of external social laws and forces determining human behaviour. Like the subject, such universal laws are partial, fragmentary, and incomplete.

To borrow from Shakespeare's Mercutio, the postmodernists call a pox on both the positivist and interpretivist houses. We have to rethink our notions of agency and determinism, processes and objects, conflict and power.

Critical theory and postmodernism provide new theoretical and practical perspectives on Information Systems in an era of the digital native and ubiquitous information flows. How these perspectives can assist us will be discussed in the next section.

IS OF THE INFORMATION AGE

Vodanovich et al., (2010) have called for a refocus of IS in terms of what constitute the major research questions in the information age, while Yoo (2010), Olikowski (2007), and Olikowski and Scott (2008) call for a change in our theoretical perspective for the information age. IS in the information age requires new research questions and new theories to underpin them. Vodanovich et al. (2010: 715) suggest four research questions as starting points:

- How and why are digital natives engaging with UIS? (ubiquitous information systems)
- How are traditional IS being transformed by digital natives and UIS?
- How do we design and implement UIS for digital natives?
- What are the positive and negative impacts of UIS on digital natives, organizations, and society?

These are very new questions for the mainstream information systems discipline and directly attempt to follow IS into the world. Taken as a whole the questions are not instrumental nor business oriented and attempt to identify our engagement with systems and to consider how such systems impact on us and the implications for current systems and future systems design. By considering positive and negative impact it presages a budding critical information systems. It does not assume a consensual or singular view of the consequences of ubiquitous information systems. It opens the question of "what are the impacts and for whom?"

The questions as posed concern the relations (engagements and impacts) of subjects (digital natives, designers) and objects (UIS, organisations and society). As we have briefly described above, postmodernism has radically questioned the coherence of entities and the ontological primacy of subjects and societies and organisations. We have to rethink what constitutes a subject, a digital native or otherwise, and its relations in and with the world. The consensus view is that the subject is instantiated in its enactment through engagement in social practices (Butler, 1990; Giddens, 1991; Schatzki, 1996). It is also recognised that the self is, as Yoo (2010) drawing on Heidegger points out, an embodied agent (Taylor, 2006) and that we experience the world through our bodies.

This viewpoint is quite different to Cartesianism where: (1) space and time are abstract entities filled with objects with particular properties and laws of relations; and (2) the realm of the mind is separate to and interprets this world. Yoo (2010:218) referring to Heidegger (1962) points this distinction out succinctly, rather than the "world being out there and understanding it through abstract representations using symbols, I *am in the world* and my existence in the world shapes the way I understand it" (italics in original).

An embodied agent is part of the world and space and time are not abstract entities but are structured according to our experience and social practices (Schatzki, 1996; Taylor, 2006). We thus experience and perceive the world directly not second hand through the interpretation of the world. This is the theoretical challenge that faces IS as it attempts to understand experiential computing.

Orlikowski had also recently provided a further theoretical challenge – that of sociomateriality. Sociomateriality is quite a new postmodern theory and draws upon the ontological framework of Barad (2007), actor network theory (Latour, 2005), and process theories (Whitehead, 1929). Its essential non-Cartesian insight is that the social and physical worlds are not ontologically separate but enmeshed or entangled. The realisation or instantiation of matter is affected by what we do to it, and the apparatuses by which we view or interact with it. From this viewpoint, matter are not objects in space but a Heraclitean flux by which our social practices and apparatuses (eyes, telescopes, walking sticks and so on) fix according to our intentions (Dreyfus, 1996).

As a new theory there is much to discuss, particularly its relationship to the embodied agent. For Information Systems the plasticity, flux and physical/social entanglement has a particular resonance for information. If it is true as Yoo (2010:220) suggests that "IS was born as the discipline of the artificial world" and where the ubiquity of information systems means a constant shifting in and between different realities, sociomateriality or at least our critical encounter with it, will help inform our theory of the digital native in a digital (and non digital) world.

Returning to Vodanovich et al's (2010) questions cited above we suggest a slight variation to accommodate a postmodern and critical perspective, and the emerging sociomaterial perspective:

- How are digital natives and UIS co-constituting each other? We introduce the notion of 'co-constitution' here to suggest the plexus between the embodied agent and the artificial digital world. As a consequence of engagement in a digital world our identity, what we take ourselves to be, changes and we will of course

change that world. Postmodernity is well versed in the notion of the construction of self. What IS can contribute is how the self is produced through information technology as we produce that technology.

- What are the relations between design, implementation and appropriation of UIS for digital natives? Design and implementation have always been central to information systems. Appropriation considers how these designs are taken up or implementations are championed and by whom in our everyday concerns. Appropriation implies potential conflict over design and use. Such relations in turn inform the design and the horizon of problems such relations and concerns produce.

- What are the positive and negative impacts of UIS on digital natives, organizations, and society? While aware of the criticisms put forward by Orlikowski and Scott (2008) on the notion of impact, we have retained this question because of its normative intent. It introduces into IS a moral and critical purpose.

- How are traditional IS being transformed by digital natives and UIS? This is an important question, how traditional IS is appropriated, redesigned and transformed in the 21sth century.   It also has implications for how IS is traditionally organised and taught in universities and teaching and training institutions.

CONCLUSION

Our paper concludes that the origins of IS was positivist and pragmatic and deeply embedded in modernism. However, as our relationship to digital technology became more embedded in our world and as the world has became more incredulous and dismayed at the modernist program (cf Lyotard, 1984; Bauman, 1989), the discipline must change. We must now consider the digital native in a ubiquitous information system that incorporates the insights of critical and postmodern thinking. Without which we may well be marooned on a desert island in a rising sea. Drawing on Yoo (2010), and Vodanovich et al (2010) we provide some suggestions for the life raft and beyond.

REFERENCES

Ackoff, R. L. (1967) Management Misinformation Systems, Management Science, 14 (4), pp. pp. B-147-B-156.

Avison, D. and Elliot, S. (2006) Scoping the discipline of Information Systems, In Information Systems. The State of the Field, Vol. John Wiley and Sons (Eds, King, J. and Lyytinen, K.) Chichester, pp. 3-18.

Barad, K. M. (2007) Meeting the universe halfway: quantum physics and the entanglement of matter and meaning Duke University Press.

Bauman, Z. (1989) Modernity and the Holocaust, Cornell University Press, Ithaca, N.Y.

Benbasat, I. and Weber, R. (1996) Research Commentary: Rethinking "Diversity" in Information Systems Research, Information Systems Research, 7 (4), pp. 389-399.

Bjørn-Andersen, N. and Hedberg, B. (1977) Designing information systems in an organizational perspective, Studies in the Management Sciences Prescriptive Models of Organizations, 5 pp 125-142.

Butler, J. (1990) Gender Trouble: Feminism and the Subversion of Identity, Routledge, New York.

Caminer, D. T. (1958) And How to Avoid Them, The Computer Journal 1(1), pp. 11-14.

Carr, N. G. (2003) IT Doesn't Matter, Harvard Business Review, pp 1-10.

Chen, W. and Hirschheim, R. (2004) A paradigmatic and methodological examination of information systems research from 1991 to 2001, Information Systems Journal, 14 pp 197-235.

Clarke, R. (2008) A retrospective of the information systems discipline in Australia, In The Information Systems Academic Discipline in Australia(Ed, Gable, G.) ANU Press, Canberra, pp. 75-135.

Claver, E., Gonzalez, R. and Llopis, J. (2000) An analysis of research in information systems (1981-1997), Information & Management, 37 pp 181-195.

Davis, G. B. (2006) Foreword, In Information Systems: The State of the Field(Eds, King, J. L. and Lyytinen, K.) John Wiley & Sons, Chichester, England.

Dearden, J. (1972) MIS is a marriage, Harvard Business Review, 50 (1), pp. 90-99.

Dreyfus, H. L. (1996) The Current Relevance of Merleau-Ponty's Phenomenology of Embodiment, The Electronic Journal of Analytic Philosophy, 4.

Foucault, M. (1984) What is Enlightenment?, In The Foucault Reader:(Ed, Rabinow, P.) Penguin, Harmondsworth.

Foucault, M. (2002) The subject and power, In Power: Essential Works of Foucault 1954-1984, Vol. 3 (Ed, Fabian, J., D.) Penguin, London.

George, J. V., J.Valor, J. (2005) Does Information Systems Still Matter?, Communications of the Association for Information Systems 16 pp 219-232.

Gergen, K. J. (1994) Exploring the postmodern: Perils or potentials?, American Psychologist, 49 pp 412-416.

Giddens, A. (1991) Modernity and Self-identity: Self and Society in the Late Modern Age, Polity Press, Cambridge.

Harvey, D. (1990) The condition of postmodernity : an enquiry into the origins of cultural change, Blackwell, Oxford [England] ; Cambridge, Mass., USA.

Heidegger, M. (1962) Being and Time, Harper & Row, New York.

Keller, S. and Coulthard, D. (2010) Charting changes in the discipline : a tri-continental analysis, ECIS 2011 Proceedings of the 19th European Conference on Information Systems : ICT and Sustainable Service Development, Aalto University, Helsinki, Finland, pp. 1-13.

Latour, B. (2005) Reassembling the social: an introduction to Actor-network theory, Oxford University Press, Oxford.

Laver, F. J. M. (1964) A user's view of A.D.P. systems design, The Computer Journal, 7 (2), pp. 93-94.

Lyotard, J.-F. (1984) The postmodern condition : a report on knowledge, Manchester University Press, Manchester.

Mason, R. O. and Mitroff, I. I. (1973) A Program for Research on Management Information Systems, Management Science, 19 (5), pp. 475-487.

Mumford, E. and Banks (1967) The Computer and the Clerk, Routledge Kegan Paul, London.

Orlikowski, W. J. (2007) Sociomaterial Practices: Exploring Technology at Work, Organization Studies 28 (9), pp. pp. 1435-1448.

Orlikowski, W. J. and Baroudi, J. J. (1991) Studying information technology in organizations: research approaches and assumptions., Information Systems Research, 2 (1), pp. 1-28.

Orlikowski, W. J. and Scott, S. V. (2008) Sociomateriality: Challenging the separation of technology, work and organization, The Academy of Management Annals, 2 (1), pp. 433-474.

Rose, N. (1996) Inventing Our Selves: Psychology, Power, and Personhood, Cambridge University Press, Cambridge.

Schatzki, T. R. (1996) Social Practices: A Wittgensteinian Approach to Human Activity and the Social., Cambridge University Press, Cambridge.

Taylor, C. (2006) Engaged agency and background in Heidegger In The Cambridge companion to Heidegger(Ed, Guignon, C. B.) Cambridge University Press, Cambridge ; New York, pp. 202-221.

Vessey, I., Ramesh, V. and Glass, R. L. (2002) Research in Information Systems: An Empirical Study of Diversity in the Discipline and Its Journals J. Manage. Inf. Syst. , 19 (2), pp. 129-174

Vodanovich, S., Sundaram, D. and Myers, M. (2010) Digital Natives and Ubiquitous Information Systems., Information Systems Research, 21 (4), pp. 711-723.

Weber, R. (2004) The rhetoric of positivism versus interpretivism: a personal view (Editor's Comments). MIS Quarterly, 28 (1), pp. iii-xii.

Whitehead, A. N. (1929) Process and Reality: An Essay in Cosmology, Free Press.

Yoo, Y. (2010) Computing in everyday life: a call for research on experiential computing MIS Quarterly, 34 (2), pp. 213-231.

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