

GIDDENS'S STRUCTURATION THEORY AND INFORMATION SYSTEMS RESEARCH¹

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Abstract

The work of the contemporary British sociologist Anthony Giddens, and in particular his structuration theory, has been widely cited by Information Systems researchers. This paper presents a critical review of the work of Giddens and its application in the Information Systems field. Following a brief overview of Giddens's work as a whole, some key aspects of structuration theory are described, and their implications for Information Systems research discussed. We then identify 331 Information Systems articles published between 1983 and 2004 that have drawn on Giddens's work and analyze their use of structuration theory. Based on this analysis

a number of features of structural research in the Information Systems field and its relationship to Giddens's ideas are discussed. These findings offer insight on Information Systems researchers' use of social theory in general and suggest that there may be significant opportunities for the Information Systems field in pursuing structural research that engages sympathetically, yet critically, with Giddens's work.

Keywords: Structuration theory, review, IS research

Introduction

Over the years, research in the Information Systems field has drawn on a range of different social theories to gain insights on IS phenomena. These include symbolic interactionism (Gopal and Prasad 2000), institutional theory (King et al. 1994), critical social theory (Ngwenyama and Lee 1997), and actor network theory (Braa et al. 2004). Among these, perhaps the most influential has been structuration theory (Poole and DeSanctis 2004). A review of structural research in the IS field, therefore, provides an important opportunity to explore how social theory has been used in the field.

A number of structural theorists (Urry 1982), including Bourdieu (1977) and Bhaskar (1979), have drawn on Berger and Luckmann's (1967) concept of the mutual constitution of society and individuals. It is the work of British sociologist Anthony Giddens, however, that has attracted most interest across a range of social and organizational fields, not least IS, making him one of the world's most-cited sociologists (Bryant and Jary 2001, p. 43).

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Although, as this paper will seek to illustrate, there are a number of features of Giddens's theory, such as the almost total neglect of the technological artefact and its abstract, non-propositional character, that make it an unlikely source of insight for IS researchers, it also has a number of significant strengths. These include its provision of a non-dualistic account of the structure/agency relationship, which may be seen to avoid determinism of either the technological or social kind (Markus and Robey 1988); its dynamic conceptualization of structure as being continuously produced and reproduced through situated practice, which facilitates the study of change (Orlikowski 2000); and its broad-ranging account of social processes, which takes in many phenomena of interest to IS researchers.

This paper has three main aims: first, to provide a critical appraisal of Giddens's structuration theory in order to assess its strengths and weaknesses as an approach to the study of IS; second, to review the different ways in which it has been employed in the field and the insight this offers on the use of social theory in the IS field; and third, to suggest how structurational IS research (and potentially, by analogy, other IS research that uses theories borrowed from other fields) might be advanced in future in the light of the preceding analysis. The first section of the paper comprises a summary and discussion of Giddens's structurational ideas, locating these within the broader scheme of his work and highlighting a number of issues of particular significance to IS researchers. This is followed by an analysis of IS research papers that have drawn on Giddens's ideas over time, paying particular attention to the way in which these have employed structuration theory. The final section identifies a number of opportunities for structurational research in the IS field that, it is argued, have, as yet, been relatively neglected, and draws conclusions on IS researchers' use of structuration and social theory in general.

The paper differs from previous studies of the use of structuration in IS research in four respects. The first is the identification of a number of key issues in the use of structuration in IS research, based on a detailed discussion of Giddens's own writings. While other sources, such as Jones (1999), have discussed Giddens's position, have identified a number of quandaries for IS researchers employing structuration theory (Poole and DeSanctis 2004), or have distinguished three "key concepts" of Giddens's work (Pozzebon and Pinsonneault 2005), none has offered such a thorough presentation of potential issues for IS researchers raised by Giddens's work. Second is the scope of the analysis of structurational IS research, which is considerably more systematic and also more extensive, than previous studies. The current paper thus offers a more substantial and detailed

assessment of structuration's contribution than previously available. Third, the paper analyzes the use of structuration theory in the IS field in terms of a number of categories that illustrate different types of relationships between IS research and research in other disciplines. It therefore situates structuration within broader debates about the use of social theory in the IS field. Finally, the paper puts forward an agenda for structurational IS research, based on Giddens's own writings, rather than rejecting some of its central principles, as Poole and DeSanctis (2004) have recently proposed. In doing so, the intention is not to proscribe other agendas, but rather to show that there are rich opportunities for IS research that engages in a sympathetic, but not uncritical, way with Giddens's ideas.

Structuration Theory in the Context of Giddens's Work

While Giddens is known in the IS field primarily for his structuration theory, since the early 1970s he has published more than 30 substantial sociological works, all of which he considers to be part of a single, continuous intellectual project (Bryant and Jary 2001, p. 6). It would, therefore, seem desirable, when discussing structuration, to be aware of this broader context.

The first books published by Giddens were two critical studies of classical sociology, *Capitalism and Modern Social Theory* (1971) and *The Class Structure of the Advanced Societies* (1973), focusing on the work of Durkheim, Marx, and Weber. It was not until the publication of *New Rules of Sociological Method* (1976, second edition 1993) that Giddens began to set out his own theoretical position, *structuration theory*, as he named it. This was subsequently elaborated in three further books: *Central Problems in Social Theory* (1979), *A Contemporary Critique of Historical Materialism* (1981, second edition 1994), and *The Constitution of Society* (1984). Reflecting the widespread interest in this work, structuration has attracted considerable academic debate, in which Giddens has actively participated (see, for example, Bryant and Jary 1991a; Clark et al. 1990; Giddens 1983; Giddens and Pierson 1998; Held and Thompson 1989).

Notwithstanding Giddens's claim about the continuity of his work, his subsequent writings have largely moved away from explicit discussion of structuration theory. Thus *The Consequences of Modernity* (1990a), *Modernity and Self Identity* (1991a), and *The Transformation of Intimacy* (1992) focus on the changing character of modernity at the societal and, later, the individual level. These ideas, especially relating to

globalization and the “risk society” (Beck 1992), were further explored in a contribution to *Reflexive Modernization* (Beck et al. 1995) and in *Runaway World* (Giddens 1999) and *On the Edge: Living with Global Capitalism* (Hutton and Giddens 2001). Most recently, Giddens's increasing engagement in practical politics, as an advisor to the British government from 1997, has been expressed in his books *Beyond Left and Right* (1994), *The Third Way* (1998), *The Third Way and its Critics* (2000), *Where Now for New Labour?* (2002), *Europe in the Global Age* (2007), and *Over to You, Mr Brown – How Labour Can Win Again* (2007). The main focus of this review, therefore, will be on works in the IS field drawing on Giddens's writings between 1976 and 1984 in which he set out the key arguments of structuration theory, although IS studies citing Giddens's other writings will also be considered, especially as they relate to structuration theory.

Structuration Theory

In discussing structuration theory in relation to IS research it should be emphasized at the outset that it is a general theory of social organization rather than a theory specific to IS. Moreover, apart from some comments on the knowledge society and digital economy (Giddens and Pierson 1998; Hutton and Giddens 2001), Giddens makes almost no reference to IS in his writings (or, indeed, to the specifics of social and organizational changes in which IS might be implicated). Rather, Giddens's primary objective (Gregory 1986), has been the establishment of an ontology of human society, an account of “what sort of things are out there in the world, not what is happening to, or between, them” (Craib 1992, p. 108). Structuration theory, therefore, deals with social phenomena at a high level of abstraction rather than their particular instantiation in a specific context. Combined with the dense, and occasionally abstruse, style of Giddens's writing, this can make it difficult to grasp the significance of structuration theory in the IS context. It would therefore seem necessary to sketch out some of the key features of this theory and their possible implications before considering the ways in which it has been used by IS researchers.

Giddens's Concept of Structuration: An Overview

The central concern of structuration theory is the relationship between individuals and society. Rejecting traditional dualistic views that see social phenomena as determined either by objective social structures, which are properties of society as

a whole, or by autonomous human agents, Giddens proposes that structure and agency are a mutually constitutive duality. Thus social phenomena are not the product of *either* structure *or* agency, but of both. Social structure is not independent of agency, nor is agency independent of structure. Rather, human agents draw on social structures in their actions, and at the same time these actions serve to produce and reproduce social structure.

For analytical purposes, Giddens identifies three dimensions of structure (signification, domination, and legitimation), reflecting, it may be argued, his earlier theoretical interests in the work of Durkheim, Marx, and Weber. Corresponding dimensions of interaction, described as communication, power, and sanctions, are identified, with which the structural dimensions are linked through *modalities* of, respectively, interpretive schemes, facilities, and norms, as shown in Figure 1.

An everyday example may help to illustrate this. The clothes that people wear to work reflect the influence of social structures that are reproduced by individuals' conformance with accepted practice. We may expect, for example, that people working in an office will typically wear, more or less formal, business attire, such as a suit or smart casual clothing. When encountering somebody in a work setting we draw on *structures of signification* that inform our understanding of that person's role. So, if we meet a person in a white coat in a hospital we are likely to assume that they are a doctor (at least in many settings), or, in a laboratory, that they are a scientist. Clothes do not simply indicate who a person is, but also convey important messages about the powers that they are considered to hold (i.e., *structures of domination*). Thus police officers' uniforms enable them to gain access to a crime scene or to influence people's behavior in ways that would be unlikely to be successful if they were in plain clothes, while in a military setting, sometimes subtle differences in people's uniforms are important indicators of rank that are significant in that context, whether or not they are recognized by civilians. There are also *structures of legitimation* that define the appropriate dress code in particular settings, the transgression of which may invoke sanctions. While no longer formally codified in sumptuary laws that defined permitted standards of dress at certain historical periods (Freudenberger 1963), contemporary organizations may differ, for example, in the degree of formality expected in employees' dress, and even “dress-down Fridays” may be subject to clear limits on how casual attire may be: polo shirts allowed, perhaps; sleeveless T-shirts, unacceptable.

As may be evident from this example, the structures underlying dress codes are not inplacable or immutable. They are

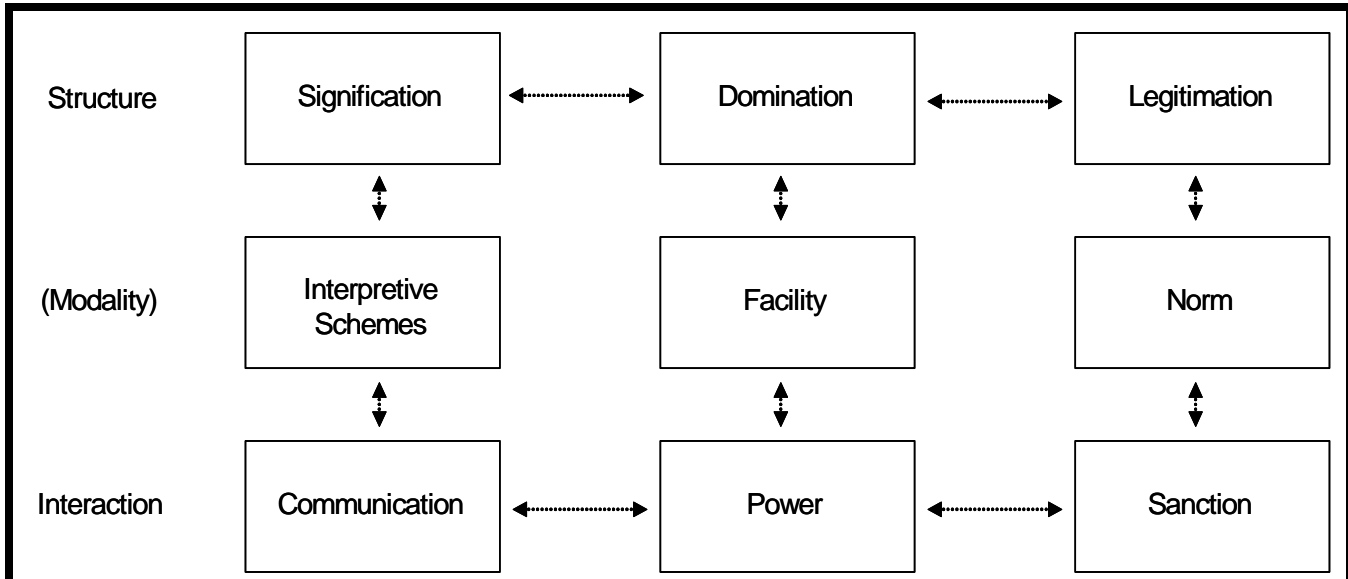


Figure 1. The Dimensions of the Duality of Structure (adapted from Giddens 1984, p. 29)

sustained by their ongoing reproduction by social actors, but can be changed. So long as employees continue to follow the dress code, then its influence on the behavior of new recruits is likely to be maintained. If certain individuals or groups challenge the code, then, over time, new structures, no less influential, may develop, as can be seen in trends toward more relaxed dress codes, such as IBM staff wearing suits of a color other than blue, or British judges and lawyers no longer being required to wear wigs in court. Individuals are thus seen as possessing the capability to transform structures.

The production and reproduction of structure by action, moreover, may not occur exactly as expected, as there may be both unacknowledged conditions and unintended consequences of intentional action. For example, the structures of signification associated with a white coat may be traded on by a cosmetics salesperson, or an actor in a commercial, to suggest that they have technical expertise, or, more seriously, by a fantasist who pretends to be a doctor. The reproduction of accepted behavior may therefore have the unintended consequence of also promoting other, potentially undesirable, behavior.

Structuration Theory in More Detail

While the duality of structure is central to Giddens's theory, his argument is considerably more wide-ranging. An examination of some of the distinctive features of his approach

would seem necessary to assess the way in which it has been used, and its future potential, in the IS research field². The focus of this discussion will be on those features of structuration theory that would seem most significant for IS researchers, either because they are at odds with widely held ontological, epistemological and methodological assumptions in the field, or because they address phenomena in which information systems are increasingly seen to be implicated.

The Origins of Structuration Theory and its Implications

Giddens developed structuration theory as a way of overcoming what he saw as deficiencies in the two approaches dominating social analysis in the late 1970s and early 1980s. One of these was positivism, or "naturalistic" sociology as Giddens refers to it (reflecting its tendency to objectivism and its identification of biology as the most compatible model for social science [Giddens 1984, p. 1]). Identifying "functionalist and structural approaches" as examples of this type, Giddens argued that they were "strong on structure, but weak on action" (1993, p. 4), seeing human agents as inert and inept, and emphasizing "the pre-eminence of the social whole

²A more comprehensive and detailed discussion of Giddens's work may be found in the extensive critical literature, including Bryant and Jary (1991b, 1997, 2001), Clark et al. (1990), Cohen (1989), Craib (1992), Giddens and Pierson (1998), Held and Thompson (1989), Mestrovic (1998), Stones (2005), and Tucker (1998).

over its individual parts" (1984, p. 1). Giddens was equally critical, however, of interpretative sociologies, such as Schutz's phenomenology, Garfinkel's ethnomethodology, and post-Wittgensteinian language philosophy for being "strong on action, but weak on structure," and having little to say on issues of "constraint, power and large-scale social organization" (1993, p. 4). Structuration, therefore, sought to avoid such asymmetrical and dualistic treatment of action and structure by conceptualizing the two as a mutually constitutive duality.

Giddens's rejection of objectivism and naturalistic approaches, leads him to adopt a post-empiricist and anti-positivist approach to methodology (Bryant and Jary 1991a), describing the existence of universal laws of human activity, of the type sought by positivist researchers, as "markedly implausible" (Giddens 1984, p. 345). Moreover, notwithstanding his criticisms of interpretative approaches, Giddens describes the social sciences as "irretrievably hermeneutic" (1993, p. 13), that is, reliant on interpretation. This does not mean, however, that "technically-sophisticated, hard-edged" research has no contribution to make in social research (Giddens 1991b, p. 219). Indeed, he specifically states,

I do not try to wield a methodological scalpel...there is [nothing] in the logic or the substance of structuration theory which would somehow prohibit the use of some specific research technique, such as survey methods, questionnaires or whatever (Giddens 1984, p. xxx).

These remarks do not contradict Giddens's criticisms of positivism, though, as they relate to the use of particular data-gathering techniques, rather than the epistemology of the research approach in which they are employed. This is borne out by Giddens's later comment that "the intellectual claims of sociology do not rest distinctively upon [hard-edged research]. All social research in my view, no matter how mathematical or quantitative, presumes ethnography" (1991b, p. 219). Hence, even a survey or experiment using only quantitative data necessarily relies upon some prior interpretation of the phenomenon under study—for example, the sorts of social practices involved in group decision-making—that renders these data meaningful. Thus, for Giddens, all social research depends, at some level, on detailed study (and interpretation) of specific social settings (i.e., ethnography) regardless of the specific data gathering and analysis techniques it employs.

Giddens's Concept of Structure

In employing *structuration*, a term he borrowed from French, to describe his theory, Giddens sought to emphasize that

social structure is continuously being created through the flow of everyday social practice. His position, therefore, differs from prevailing positivist and micro-sociological conceptualizations that view structure as either law-like regularities among social facts or patterns of aggregate behavior that are stable over time (Porpora 1989). "We should see social life, not just as society out there or just the product of the individual here, but as a series of ongoing activities and practices that people carry on, which at the same time reproduce larger institutions" (Giddens and Pierson 1998, p. 76). The emphasis of structuration is therefore on the interplay between individuals and society rather than on one or the other, and on process rather than static properties or patterns.

As a result, Giddens adopts a particular, unconventional definition of structure as "rules and resources, organized as properties of social systems" that exists only as structural properties (1984, p. 25). These resources are seen as being of two types: allocative, which refers to "transformative capacity generating command over objects, goods or material phenomena" and authoritative, which refers to "transformative capacity generating commands over persons or actors" (Giddens 1984, p. 33). Giddens also distinguishes between "rules of social life [which are] techniques or generalizable procedures applied in the enactment/reproduction of social practices" and "formulated rules," such as those of a game or a bureaucracy, which are "codified interpretations of rules rather than rules as such" (1984, pp. 17-23). Comparing the former with mathematical formulae, Giddens (1984, p. 20) argues that they provide rules for how to carry on in a given situation that individuals may be able to state without understanding their meaning or observe without being able to describe the underlying principle.

A potentially significant implication of Giddens's view of structure from an IS perspective is that it is "a 'virtual order' of transformative relations...that exists, as time-space presence, only in its instantiations in [reproduced social] practices and as memory traces orienting the conduct of knowledgeable human agents" (1984, p. 17). This is the case, Giddens argues, even for apparently material allocative resources (such as land or information technology) which "might seem to have a 'real existence' [but which] become resources only when incorporated within processes of structuration" (1984, p. 33). As he puts it, therefore, in one of his very few direct statements on the topic, "Technology does nothing, except as implicated in the actions of human beings" (Giddens and Pierson 1998, p. 82).

This does not mean, however, that Giddens denies the existence of a material world that affects how people act. As he puts it in Giddens and Pierson (1998, p. 82), "you can't

just walk straight through a wall.” Rather Giddens is seeking to distinguish between how the physical world affects action and how social structure influences social practice. In the latter case, he argues, the “causal effects of structural properties of human institutions are there simply because they are produced and reproduced in everyday actions” (Giddens and Pierson 1998, p. 82). It is not, therefore, that technology can have no influence on social practice, but that whatever effects it has depend on how social agents engage with it in their actions. Thus, “as they do things in relation to machines and so forth, these are the stuff out of which structural properties are constructed” (Giddens and Pierson 1998, p. 83). What this “relation to machines” might be, and how it affects the things social actors do, however, is not elaborated.

In proposing that structure has no physical existence and is only given substance through what people do, therefore, structuration does not mediate between objectivist and subjectivist accounts of social practices, but rather adopts a subjectivist position (Porpora 1989). Moreover, despite the claims of Layder (1987) and New (1994) that there is nothing within structuration that is necessarily incompatible with realism, Giddens maintains that the rules and resources constituting structure are only in agents' heads (Giddens and Pierson 1998, pp. 82ff).

In IS terms, therefore, structure, as defined by Giddens, cannot be *inscribed* or *embedded* in technology, since to do so would be to give it an existence separate from the practices of social actors and independent of action, thereby turning the duality, which is such a central feature of Giddens's position, into a dualism. Ontologically, a structure that resides in a real, material, artefact would also seem clearly distinct from one that exists only when instantiated in the practices of social actors. If IS research, including studies that identify themselves as structurational, identify structures within technology, therefore, then what they are describing are not structures as Giddens would understand them, and do not necessarily have the properties, such as mutual constitution with action and transcendence of traditional dualisms, that structuration theory attributes to them.

Giddens's view that social structure exists only in the instant of action has also been criticized by Archer (1995, p. 61), who argues that such “central conflation” of structure and agency, means that structure is a product solely of contemporary practices, that it only exists in the here and now. How, then, to account for the effects of past social practices on present action? To avoid this “chicken or egg” problem, Archer proposes what she calls the “morphogenetic/morphostatic approach” that views society (social structure) as preexisting the individual, but being transformed or reproduced through

their actions. Stones (2005), however, argues that Archer's criticisms are misplaced. While Giddens focuses predominantly on the instantiation of structure in “what people actually do” (Giddens and Pierson 1998, p. 81), he also recognizes that their actions take place within a context that “places limits upon the range of options open to [them]” (Giddens 1984, p. 177) and that may have an objective existence. Stones suggests that, for Giddens, structuration involves both virtual *internal* and objective *external* structures, but social action is always mediated through the former.

Agency in Giddens's Structuration Theory

Giddens's view of human agency is strongly voluntaristic, arguing that, except in situations where they have been drugged and manhandled by others, human agents always “have the possibility of doing otherwise” (1989, p. 258). Thus, “the seed of change is there in every act which contributes towards the reproduction of any ‘ordered’ form of social life” (Giddens 1993, p. 108). It also leads Giddens to argue that structure is always enabling as well as constraining. Compared to Bourdieu (1977) for example, who sees agency as much more shaped by structural forces (even in the unintended consequences of actions), or institutional theory (Scott 2001), which focuses on how actors' beliefs and behaviors are shaped by their broader social context, therefore, Giddens's agents are highly autonomous.

Giddens's position has been criticized by writers such as Bhaskar (1979) and Callinicos (1985), who question whether structural constraint simply places “limits upon the feasible range of options open to an actor in a given circumstance” (Giddens 1984, p. 177). In many situations, his critics argue, agents often have effectively only one feasible option. This leads Archer (1990) to propose that rather than being inseparable, constraint and action operate sequentially, while for Layder (1985, p. 146) structural power is “not simply a negotiable outcome of routine and concrete interactions and relationships,” rather it may transcend and precede individual action and be relatively enduring.

This is a particular issue, Barbalet (1987) argues, when considering material artefacts (which may be potentially significant in the information systems context, as has been noted). For Giddens these cannot, themselves, be social structural resources (as he defines them) in power relations. They can, therefore, have no direct influence on action. Storper (1985, p. 418) suggests that Giddens underestimates how material artefacts may affect action, arguing that “the *durée* of the material, although not imposing absolute constraints on system change, does mean that at any moment not everything is possible.”

Giddens, however, argues that anything other than his strong conception of agency amounts to a form of determinism. Even the threat of death, he states, has no force, without the individual's wish not to die (Giddens 1984, p. 175). Effective power thus depends on the acquiescence of those subject to it. Like Foucault (1979), therefore, Giddens's view of power is relational, based on a dialectic of control in which "all forms of dependence offer some resources whereby those who are subordinate can influence the activities of their superiors" (1984, p. 16). Rather than seeing power as a type of act (making people do things against their will, for example) or a stock of capital (like land or money that can be owned), Giddens views it as a capability manifested in action.

Agents' Knowledgeability

It is an important feature of Giddens's position that "every member of a society must know...a great deal about the workings of that society by virtue of his or her participation in it" (1979, p. 250). This knowledge is seen to be of three types: *discursive consciousness*—"all those things that actors can say, put into words, about the conditions of their action" (Giddens 1983, p. 76)—and *practical consciousness*—"what actors know, but cannot necessarily put into words, about how to go on in the multiplicity of contexts of social life" and "unconscious sources of cognition" (Giddens 1979, p. 5). Rather than being the cultural or "structural dopes...of stunning mediocrity" (Giddens 1979, p. 52) suggested by naturalistic (i.e., positivist) theories, structuration sees social actors as continuously reflecting on their practice. Social actors are not only aware of how society works but may also be aware of sociological accounts of social practices in ways that may influence their understanding of their own actions (processes that Giddens refers to as *discursive penetration* and *double hermeneutic* respectively).

If social actors know a lot about how to "go on" in society, this does not mean that they are always in control of their actions. "The production or constitution of society is a skilled accomplishment of its members, but one that does not take place under conditions that are either wholly intended or wholly comprehended by them" (Giddens 1993, p. 108). This contributes to Giddens's scepticism about universal social laws referred to earlier, but also to the view that social generalizations are necessarily historical, that is, temporally and spatially circumscribed. In the terminology of Markus and Robey (1988), therefore, structuration may be seen as an emergent theory—indeed Barley's (1986) structural study of computed tomography scanners is cited by them as one of the examples of this type. It is thus "hard to imagine," as Markus and Robey put it, how structuration "could

effectively be cast as variance models" (p. 592). Pozzebon and Pinsonneault (2005) reach similar conclusions.

Temporality and Routine

Time and temporality has been a recurring theme of Giddens's major writings. He sees structuration as involving three "intersecting planes of temporality": *durée* (the temporality of day-to-day life), the temporality of the Heideggerian *dasein* (the directionality of the human lifespan from birth to death) and the *longue durée* (the temporality of social institutions) (Giddens 1981, p. 28). Thus structuration, it is claimed, links the temporality of the individual with that of institutions.

Structuration's emphasis on the ongoing production and reproduction of structure through action over time leads to a distinctive concern with routinization on all three planes of temporality. Thus Giddens argues that routine is "integral to the continuity of the personality of the agent...and to the institutions of society" (1984, p. 60). Predictable routines and encounters provide individuals with ontological security, which underpins their personal identity.

Routines also play an important role in sustaining social institutions. Here Giddens distinguishes between two levels of integration, or "regularized relations of relative autonomy and dependence" between social practices. The first he refers to as "social integration" that is "systemness on the level of face-to-face interaction," while the second is, "system integration" or "systemness on the level of relations between social systems or collectivities" (Giddens 1979, p. 76). From an IS standpoint, these concepts would seem particularly significant in view of the role of information technology in the changing temporal and spatial character of modern organizations. Interestingly, this is recognized by Giddens in one of the very few references to information technology in his structural writings, where he notes that "mediated contacts that permit some of the intimacies of co-presence are made possible in the modern era by electronic communication" (1984, p. 68). This suggests, therefore, that IS may facilitate social integration without co-presence.

Giddens's Later Work

Although there is relatively little explicit reference to structuration in Giddens's later work, it does raise a number of themes that would seem relevant to IS researchers. Thus in *The Consequences of Modernity* (1990a) he discusses how, in modern societies, social relations are disembedded, or "'lifted out' from local contexts of interaction and...restructur[ed]

across indefinite spans of time-space" (p. 21). He also refers to two specific disembedding mechanisms: *symbolic tokens* and *expert systems*, in which IS may be seen to be implicated. The former refers to "media of interchange that can be passed around without regard to the specific characteristics of individuals or groups that handle them at any particular juncture" (p. 22). Giddens identifies the abstract concept of money as an example of a symbolic token and notes its significance in the emergence of an international financial system (that is now critically dependent on IS for its operation). Giddens's distinctive notion of expert systems refers to "systems of technical accomplishment or professional expertise" (p. 27) in which individuals in contemporary society have to place trust, without knowledge of how they operate. Although the examples that Giddens cites concern buildings or transport systems, the concept would seem applicable to many IS-related phenomena, such as the relationship of individuals with the banking system or the operating system of their computer.

Despite the more personal focus of *Modernity and Self-Identity* (1991a), the concept of the "trajectory of the self," used to describe how individuals in contemporary society reflexively construct a narrative of personal identity, may be relevant to IS researchers in understanding how individuals make sense of IS phenomena and how IS are involved in shaping personal identity. Giddens refers, for example, to the *collage effect* created by electronic media, whereby distant events increasingly intrude on everyday life. The reflexive character of modern society is further explored in *Reflexive Modernization* (Beck et al. 1995) and *On the Edge* (Hutton and Giddens 2001) in which Giddens discusses the *institutional reflexivity* of our increasingly globalized (and IS dependent) society.

Structuration Theory in Relation to Empirical Research

A major concern for the use of structuration theory in the IS field is its relevance to empirical research. While some critics, such as Gregson (1989), have suggested that it is too generalized to provide guidance in specific empirical settings, Giddens rejects this and indeed has discussed its potential contribution to social research on a number of occasions (1984, pp. 281-284; 1989, p. 300; 1990b, pp. 311-313). Table 1 summarizes his fullest account of structuration's empirical relevance (1984, pp. 281-284) and describes some possible implications for IS researchers. Giddens also comments on various attempts by researchers to use structuration in empirical research projects, suggesting that, while he may not undertake such studies himself, he believes they can make useful contributions (1983; 1984, Chapter 6; 1991b, pp. 213-218).

While providing these guidelines, however, Giddens has also stated that he does not view structuration as supporting a particular research program (1983, p. 77; 1992, p. 310) and that his principles "do not supply concepts useful for the actual prosecution of research" (1990b, p. 312). He is critical, too, of those who "have attempted to import structuration theory *in toto* into their given area of study," preferring studies "in which concepts, either from the logical framework of structuration theory, or other aspects of my writings, are used in a sparing and critical fashion" (1991b, p. 213). Structural concepts may thus be seen as sensitizing devices that "provide an explication of the logic of research into human social activities and cultural products" (Giddens 1991b, p. 213), rather than a source of testable propositions.

Critics such as Gregson (1989) see structuration, therefore, as a "second-order theory" concerned not with "theorizing the unique (i.e., with explaining the events or contingencies of particular periods or places), but with conceptualizing the general constituents of human society" (p. 245). To a degree, Giddens (1989, p. 295) appears to acknowledge this in describing structuration as an example of theory, as a generic category, rather than of *theories*, or explanatory generalizations. Consequently, some authors (e.g., Weaver and Gioia 1994) have suggested that structuration should be understood as a meta-theory, a way of thinking about the world, rather than as an empirically testable explanation of social behavior. As Stones (2005) argues, however, Giddens's own focus on ontology-in-general, rather than specifics of particular settings, does not preclude structuration theory from contributing to situated analyses.

Summary

For IS researchers, therefore, Giddens's structuration theory may have a number of attractions. Chief amongst these would seem to be its perceived potential in reconciling traditionally opposed conceptualizations. This is illustrated by Orlikowski (1992), who suggests that "structuration offers a solution to the dilemma of choosing between subjective and objective conceptions of organizations and allows [researchers] to embrace both" (p. 403).

A further aspect of structuration seen by Poole and DeSanctis (2004, p. 208) as making it attractive to IS researchers is its concern with structure. Thus, despite its almost complete neglect of technology, structuration's "focus on structure and on the processes by which structures are used and modified over time" is seen as resonating with long-standing concerns in IS research about "the structuring properties of technology" and the more recent interest in "structure as a property of organizations and work groups."

Table 1. Aspects of Structuration Theory That Impinge Most Generally upon Problems of Empirical Research in the Social Sciences and Some Potential Implications for IS Research (adapted from Giddens 1984, pp. 281-284)

	Key Feature	Implication for IS Research
1	All human beings are knowledgeable agents	Researchers should consider social actors as being highly knowledgeable about what they do (even if they are not always able to express it verbally) and as actively involved in the enactment of social practices (rather than being controlled by structural forces of which they are unaware)
2	The knowledgeability of human agents is always bounded on the one hand by the unconscious and on the other by the unacknowledged conditions and unintended consequences of action	Social actors' understanding of their practices is necessarily limited, so researchers should consider their accounts as offering only a partial explanation of their actions, which needs to be supplemented by other evidence
3	The study of day-to-day life is integral to the analysis of the reproduction of institutionalized practices	If researchers want to understand large-scale, institutional, social phenomena that persist over time, they need to study the everyday practices of the relevant social actors that constitute them
4	Routine, psychologically linked to the minimizing of unconscious sources of anxiety, is the predominant form of day-to-day social activity	Most everyday social practices that researchers study are routinized (tending to reproduce social structures), and hence stable over time, because this is psychologically reassuring for social actors
5	The study of context, or of the contextualization of interaction, is inherent in the investigation of social reproduction	To understand how social practices are sustained over time, researchers need to study the particular setting in which they take place (rather than ignoring, or seeking to control, this setting)
6	Social identities, and the position-practice relations associated with them, are "markers" in the virtual time-space of structure	Although structure is virtual, its effects can be observed indirectly through its influence on the social roles that people play
7	No unitary meaning can be given to <i>constraint</i> in social analysis	A variety of different types of constraint (material, sanction, and structural) may enable and restrict social actors in a particular setting
8	Among the properties of social systems, structural properties are particularly important, since they specify overall types of society	Different types of society are characterized by different structural properties (that shape the norms, meanings, and power relations of social practices)
9	The study of power cannot be regarded as a second-order consideration in the social sciences	Accounts of social practices need to give particular attention to the operation of power relationships
10	There is no mechanism of social organization or social reproduction identified by social analysts which lay actors cannot also get to know about and actively incorporate into what they do	People can always learn about social researchers' accounts of how society works and may draw on these in their actions

In addition, Poole and DeSanctis (2004) emphasize the appeal of Giddens's dynamic view that conceptualizes structure as an interactive process. This concern with the production and reproduction of structure through practice would seem particularly attractive to IS researchers interested in processual analyses that treat social actors as knowledgeable agents actively shaping technologies and their use. As Orlikowski (2000) puts it, "a structurational perspective is inherently dynamic and grounded in ongoing human action" (p. 405).

At the same time, however, structuration theory is a product of particular debates in the 1970s and 1980s between the naturalistic and hermeneutic traditions in social theory and philosophy, which Giddens sought "to transcend without discarding altogether" (1981, p. 26). The features of Giddens's theory that attract IS researchers, therefore, are based on interests and assumptions, not all of which may be immediately evident, and some, such as the strongly voluntarist view of agency or the virtual concept of structure, run counter to widely held assumptions in the IS field. Combined with the complex and abstract character of structuration and its lack of direct empirical implications, its contribution to IS research is not straightforward.

This is illustrated in Table 2, which summarizes some key features of structuration theory, their implications, and consequent potential issues for IS research. As has been noted, some of Giddens's critics have argued that a number of his positions go further than is necessary to sustain the general principles of structuration. The features addressed by these critics are identified by shading in Table 2, indicating that, if their arguments are accepted, different implications (possibly giving rise to different issues) may follow from these features. Since Giddens, rather than these critics, has been the reference point for most IS researchers employing the theory, his position will be the primary consideration in assessing the use of structuration in IS research.

Giddens's structuration theory, therefore, offers a distinctive perspective on issues that may be relevant to IS researchers, but also has a number of features that may be potentially problematic in terms of common assumptions in the field. Bearing these challenges in mind, the use of structuration in the IS literature may now be analyzed.

Analyzing the Use of Structuration Theory in the IS Field

In order to understand IS researchers' use of Giddens's structuration theory, a search was undertaken to locate as many

articles, written in English,³ as possible that have drawn on Giddens's work to study IS phenomena. Four main methods were used to carry out this search: the first was to consult previous review articles; second was an online search of ABI/Inform and EBSCO Business Periodicals using the search terms Giddens AND Information*; third was a manual review of hard copies of a number of significant IS journals; and finally, an analysis of the proceedings of International Federation for Information Processing's Working Group 8.2 (Interaction of Information Systems and the Organization) and the International Conference on Information Systems. Further references were also sought, for example, through analysis of bibliographies of the articles themselves. The coverage of these searches is shown in Table 3.

A number of papers in the IS field that identify themselves as employing structurational ideas also reference two important variants of Giddens's work developed specifically for the study of IS phenomena: duality of technology (Orlikowski 1992) and adaptive structuration theory (AST) (DeSanctis and Poole 1994). Articles citing these papers, without necessarily any reference to Giddens, were also included in the search. Papers just citing any other secondary sources (e.g., Barley 1986) were excluded. The total number of IS papers using Giddens's ideas, either directly (i.e., citing one of his works) or via AST or duality of technology, identified by these methods was 331.⁴

Giddens was also mentioned in more than 200 further IS papers, but without any significant discussion of his work. For example, these included papers referring to Giddens as a constructivist social theorist or as a potential alternative source of theoretical insight in the context of studies using other theories. They are of interest to the present study, however, to the extent that they may be taken as indicative of awareness of Giddens in the IS literature, even if substantive use is not made of his ideas.

While the search sought, as far as possible, to be systematic and thorough, it is not claimed that it provides a complete survey of the use of Giddens's ideas in the IS literature as there may be significant articles in journals, conferences, or other sources not covered by this search. Some structurational research drawing indirectly on Giddens may also have

³Structuration has recently begun to attract attention in the French IS literature (see, for example the proceedings of the 5th Association Information et Management conference at www.aim2000.univ-montp2.fr/fr/index.html). We are also aware of articles in other European languages.

⁴A full list of these papers is available at <http://www.misq.org/archivist/vol/no32/issue1/JonesAppendix.pdf>.

Table 2. Some Key Features of Structuration Theory, Their Implications, and Some Potential Issues for IS Research (Shading Indicates Features That Are Contested by Some Critics)

Feature of Structuration Theory	Implication	Potential Issues
Rejection of both positivism and strong interpretativism	Structure does not determine action, but nor is action independent of structure	Universal social laws are markedly implausible, but accounts based solely on individual action and meaning are also inadequate
Duality of structure	Structure and agency are mutually constitutive	Structure is inseparable from agency
Structure is a "virtual order of transformative relations"	Rules and resources exist only in their instantiation and as memory traces orienting conduct	Material resources, such as technology, influence social practices only through their incorporation in processes of structuration
Agents always have the possibility to do otherwise	Structural constraint simply places limits upon the feasible range of options open to an actor in a given circumstance	Agents comply with structural constraints because they choose, rather than are forced, to do so
Agents are knowledgeable about their actions and continuously reflect on their conduct	Agents are not passive objects, subject to exogenous forces, or ignorant of the influences on their actions	People, including researchers, should be considered as active, reflexive participants in the practices in which they engage
Unacknowledged conditions and unintended consequences	Production and reproduction of society is not wholly intended or comprehended by social actors	Social generalizations are necessarily contextual
Essential recursiveness of social life	Society is a complex of recurrent practices that constitute social institutions (and individual identity)	Individual action needs to be understood in its ongoing relationship with large-scale social organization
Time space distancing	Societies "stretch" over spans of time and space	Information technologies may be able to facilitate some level of social integration "at a distance"

Table 3. Journals and Conference Proceedings Searched

Journal/Conference	Years Searched
<i>Accounting, Management and Information Technologies/ Information and Organization</i>	1991 – 2004
<i>Computer Supported Cooperative Work</i>	1992 – 2004
<i>European Journal of Information Systems</i>	1991 – 2004
<i>The Information Society</i>	1996 – 2004
<i>Information Systems Journal</i>	1994 – 2004
<i>Information Systems Research</i>	1990 – 2004
<i>Information Technology and People</i>	1990 – 2004
<i>Journal of Organizational Computing</i>	1996 – 2004
<i>Journal of Strategic Information Systems</i>	1992 – 2004
<i>Management Information Systems Quarterly</i>	1977 – 2004
<i>Organization Science</i>	1990 – 2004
<i>Scandinavian Journal of Information Systems</i>	1990 – 2004
International Conference on Information Systems proceedings	1986 – 2004
IFIP Working Group 8.2 conference proceedings	1979 – 2004
European Conference on Information Systems electronic proceedings	2000 – 2004

been excluded by the restriction of the search to papers citing Giddens, AST, or duality of technology. Its purpose is primarily illustrative of the types of IS research that have used Giddens's structuration theory and the ways in which they have used it.

As an indication of its coverage, however, the current survey may be compared with previous reviews of structuration in IS research, of which, despite its comparatively short history, there have already been several. Thus, Walsham and Han (1991) reviewed 6 papers; Rose (1998) reviewed 13 papers; Jones (1999) reviewed 50 papers (including a number in related disciplines); Pozzebon and Pinsonneault (2000, 2001, 2005) reviewed 22 papers, 22 papers, and 32 papers, respectively; and Poole and DeSanctis (2004) reviewed 44 papers. There have also been other reviews focusing on a specific geographical area, for example, Scandinavia (Iivari and Lyytinen 1998), or part of the literature, such as GDSS studies using AST (Contractor and Seibold 1993).

The Use of Structuration Theory in IS Research

With more than 300 papers in the IS literature having cited Giddens's work to date, Poole and DeSanctis's (2004, p. 207) description of structuration theory as "one of the most influential...theoretical paradigms influencing IS research in the last decade or more" and "the theoretical lens of choice for most scholars" researching the relationship between information systems and organization would seem to be confirmed. This view is also supported by an analysis of the IFIP WG8.2 proceedings (Jones 2000) that showed Giddens to have been the most frequently cited social theorist in papers presented at these conferences between 1979 and 1999. Notwithstanding the potential issues with the use of structuration theory in an IS context identified above, therefore, it would seem that it has been widely employed by IS researchers—more so, indeed, Pozzebon and Pinsonneault (2005) argue, than in other areas of organizational research.

It should be recognized, however, that these 300 or so papers constitute only a small percentage of the total published in the IS literature over the past 20 years and that a substantial proportion of the articles were written by a relatively small number of authors. Care needs to be taken, therefore, in making claims about the significance of Giddens's work in influencing IS research. Nevertheless, it is clear that there now exists a substantial body of structural IS research that can bear further analysis.

While Table 2 highlights some features of Giddens's position that may be relevant to exploring how his work has been used in the IS literature, since structuration has not been presented in this way before, it would not seem reasonable to expect that individual studies will necessarily analyze structuration in these terms. Nor, given the breadth of the theory, could individual studies necessarily be expected to consider all of the features in Table 2. The following discussion will therefore be directed primarily toward general approaches to the use of structuration in IS research (over time) with the specific treatment of features identified in Table 2 being analyzed at a more aggregate level subsequently.

What Has Structuration Theory Been Used to Study in IS Research?

As a general social theory, structuration should be applicable, in principle, to any aspect of IS research studying the relationship between IS and organizations (or society, more generally). To the extent that IS are considered to exist within a significant social context, therefore, then there should be no types of IS, phases of IS development, and use or application domains that could not be addressed from a structural perspective. What is evident, however, is that, in terms of their primary focus, as described by the authors,⁵ the 283 empirical papers analyzed (the remainder were predominantly theoretical or methodological) were strongly clustered. Thus 49 papers reported a focus on group (decision) support systems, 23 studied computer-mediated communication, and 14 studied groupware systems. Virtual teams, organizations, and communities (13) and knowledge management (10) were other types of IS with 10 or more papers. By comparison there was just one study of IS types such as CAD and telebanking. Thus structural research would seem to have been concentrated on types of IS where the importance of social "factors" is more widely recognized.

Other papers focused on phases of IS development and use rather than particular types of IS, with 46 papers identifying IS development as their primary concern, 30 focusing on organizational change and learning, 21 on general IS use (many of the studies of particular IS types might also fall under this category, but did not discuss their work in these terms), and only 3 on organizational implementation. This might be seen to suggest that IS researchers have tended to concentrate on phases where there is perceived to be the greatest scope for agency.

⁵Inconsistencies between the categories discussed reflect the different ways in which the papers' authors reported the focus of their studies.

A third group of papers reported their focus in terms of the application domains studied. These covered a very wide range, from agro-informatics to shipbuilding via education, libraries, and real estate, with only healthcare (15) attracting more than three studies. Such diversity is not unexpected, however, as, from Giddens's perspective, structuration occurs in all social settings so there is nothing to suggest that it should be more relevant to any particular domain.

What is perhaps more surprising, however, given that Giddens developed structuration as a general theory of society and that his main focus, both in his discussion of structuration and more explicitly in much of his later work, has been on the constitution of (contemporary) society, is that structural IS research has paid little attention to the broader social context of the phenomena that it addresses. While Orlikowski and Barley (2001) identify this as a potential deficiency of IS research in general, it would nevertheless seem a particular concern for researchers employing a theory that considers social actors to be continually drawing upon and also (re)constituting society.

Therefore, while the representativeness of the papers analyzed and the significance of small differences in the numbers of papers in particular categories may be open to some question, it would appear that structural IS research has tended to neglect types of IS and phases of development and use where the scope for human agency is perceived to be limited and also the societal context of IS. As the account of Giddens's work presented above sought to show, however, this would not seem a necessary corollary of structuration theory. Indeed, following Giddens's argument more closely might suggest a refocusing of structural IS research, as will be discussed later.

How Has Structuration Theory Been Used in IS Research?

In terms of the ways in which structuration has been used, the 331 papers located by the search may be divided into three broad strands, as shown in Table 4: application of structural concepts (152 papers); development and application of an IS-specific version of structuration theory (113 papers); and critical engagement with structuration theory (66 papers).

Application of Structural Concepts

This first strand of research largely takes structuration theory as a given and explores how it, and its associated concepts,

can offer insights on IS phenomena. Within this strand there appear to be three principal ways in which structuration theory ideas have been "applied." The first of these seeks to apply structuration in general in an IS context. Such papers are typically quite explicit about their use of the theory, and often include some empirical illustration of structuration in practice. Early examples of this type include Walsham and Han's (1993) study on IT strategy implementation, Boland and Greenberg's (1992) study of information systems development, and Karsten's (1995) study of the organizational implementation of a groupware system. Other papers in this group, rather than specifically exemplifying structuration, employ it more loosely as a way of challenging or transcending traditional dualisms (e.g., Crowston et al. 2001; Hargadon and Fanelli 2002; Pinsonneault and Kraemer 1993).

A second group of papers is more selective in their use of structuration theory, employing it as a background to their analysis, but focusing on particular concepts such as the temporal/spatial ordering of social practices (e.g., Sahay 1997), power and the dialectic of control (e.g., Elkjaer et al. 1991) or constraint (e.g., Nandhakumar and Jones 1997). A third, relatively small, group of IS papers have drawn on concepts from Giddens's later writings, such as self-identity (e.g., Barrett and Walsham 1999), risk (Scott 2000), or time-space and globalization (e.g., Nicholson and Sahay 2001), in a similar fashion. In these two groups, the coverage of different concepts is uneven, with many being addressed in only one or two papers. In part, this reflects the small number of papers in these categories as a whole, but perhaps also indicates perceptions of the relative significance of particular concepts in the IS context.

These papers have contributed to the IS literature in a number of ways: by illustrating the distinctive insights offered by structuration theory, both generally and in particular; by supporting non-dualistic analyses of IS phenomena; and by providing new concepts, or distinctive perspectives on existing ones, that enrich the understanding of IS phenomena. For example, Walsham (2002) argues that structuration theory provides a richer appreciation of culture than is common in the IS literature, highlighting its dynamic and emergent character and accounting for conflict and heterogeneity. More specifically, Nandhakumar and Jones (2001) draw on Giddens's analysis of time to explore the temporal and spatial organization of information systems development work practices, arguing that this provides a better understanding of the social dynamics of time management than is provided by traditional project management approaches. Similarly, Karsten (2003) presents Giddens's concepts of social and system integration as a useful way of exploring the joint management of work in a dispersed group.

Table 4. The Use of Structuration Theory in IS Research 1983-2004

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Application of structuration theory in general	0	0	0	1	0	0	3	1	1	6	6	2	5	4	4	2	3	11	9	5	7	4	74
Application of particular structuration theory concepts	0	0	0	0	1	0	0	1	3	2	1	5	3	0	4	5	3	4	2	3	5	5	47
Application of concepts from Giddens's other writings	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	2	2	2	4	5	8	5	31
<i>Application of structural concepts</i>	0	0	0	1	1	0	3	2	4	8	8	7	9	5	8	9	8	17	15	13	20	14	152
Adaptive structuration theory	1	0	1	1	0	2	2	1	2	4	5	6	2	6	4	4	6	6	1	7	4	0	65
Duality of technology	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	0	0	0	0	6
Secondary applications	0	0	0	0	0	0	0	0	0	0	1	5	2	1	5	2	4	3	1	5	6	7	42
<i>Development and application of an IS-specific version of structuration theory</i>	1	0	1	1	0	2	2	1	3	5	7	11	4	8	10	6	10	10	2	12	10	7	113
Comparative studies	0	0	0	0	1	0	0	0	1	1	2	0	2	1	1	3	2	1	4	0	0	5	24
Use of structuration theory with other theories	0	0	0	0	1	0	0	1	1	2	1	4	4	3	2	2	6	3	1	4	3	4	42
<i>Critical engagement with structuration theory</i>	0	0	0	0	2	0	0	1	2	3	3	4	6	4	3	5	8	4	5	4	3	9	66
Total	1	0	1	2	3	2	5	4	9	16	18	22	19	17	21	20	26	31	22	29	33	30	331

Development and Application of an IS-Specific Version of Structuration Theory

The second strand of research relates to studies that have sought to address Giddens's lack of attention to IS by developing and applying IS-specific versions of structuration, notably AST and the duality of technology. Given their significance to later structurational IS research (more than a third of the papers were in this category), a brief outline of the key features of these approaches may be helpful in appreciating how they have sought to incorporate technology into a structurational framework.

Adaptive Structuration Theory (AST). In a series of papers published between 1983 and 1994 (DeSanctis and Poole 1994; Poole and DeSanctis 1990, 1992; Poole and McPhee 1983; Poole et al. 1986), Poole and DeSanctis sought to modify Giddens's structuration theory to address the mutual influence of technology and social processes. Their approach, adaptive structuration theory, is based on a number of propositions, including "social structures serve as templates for planning and accomplishing tasks...designers incorporate some of these structures into the technology [with the result that the structures may be reproduced or modified], "thus creating new structures within the technology" (DeSanctis and Poole 1994, p. 125).

AST suggests that "the social structures provided by an advanced information technology can be described in two ways: structural features of the technology and the spirit of this feature set" (DeSanctis and Poole 1994, p. 126). Structural features are said to bring meaning and control (equated with Giddens's signification and domination dimensions) to group interaction. For a group support system, these might include voting algorithms and anonymous recording of ideas.

The "spirit of the feature set" is described as its underlying "general intent with regard to values and goals" (equated with Giddens's legitimation). This can be identified from

- (a) the design metaphor underlying the system;
- (b) the features it incorporates and how they are named and presented;
- (c) the nature of the user interface;
- (d) training materials and on-line guidance materials; and
- (e) other training or help provided with the system (DeSanctis and Poole 1994, p. 126).

Because IT is only one source of structure for groups, DeSanctis and Poole (1994, p. 128) argue, other sources of structure such as work tasks and the organizational environment also need to be considered.

Another important concept in AST is that of *appropriations*, based on Ollman (1971). These are described as the "immediate visible actions that evidence deeper structuration processes" (DeSanctis and Poole 1994, p. 128) and are seen as equivalent to Giddens's modalities of structuration (Poole and DeSanctis 1990). Groups may appropriate structural features through a variety of *appropriation moves*, for example by directly using technology structures, or making judgements about them; they may appropriate technology faithfully or unfaithfully; they may appropriate the features for "different instrumental uses or purposes"; and display a variety of attitudes such as comfort, respect, and challenge as structures are appropriated.

Through the use of AST, it is suggested, it is possible to develop propositions of the form: "**Given** advanced information technology and other sources of social structure n_1 to n_k **and** ideal appropriation processes, **and** decision processes that fit the task at hand, **then** desired outcomes of advanced information technology will result" (DeSanctis and Poole 1994, p. 131). If group interaction processes are inconsistent with technology's structural potential, however, then the outcomes will be less predictable and generally less favorable. This is said to illustrate the "dialectic of control between the group and the technology." DeSanctis and Poole suggest that AST is therefore able to overcome the limitations of previous structurational approaches, which, they argue, gave only weak consideration to IT, were exclusively focused at the institutional level, and relied on purely interpretative methods.

Perhaps because of its clear, functional approach (Poole and DeSanctis 2004), AST has been an important influence on structurational IS research, with about 20 percent of the papers covered in this review adopting it in one way or another. These include a series of papers "applying" AST in different domains—especially group (decision) support systems (GDSS/GSS) and computer-mediated communication (CMC)—often using laboratory-based experiments (e.g., Chidambaram 1996; Gopal et al. 1993; Miranda and Bostrom 1993). AST has itself also been adapted and extended through the introduction of new and revised methods for gathering and analyzing data (e.g., Chin et al. 1997; Chudoba 1999; Tan and Hunter 2002) and through combination with other theories (e.g., Contractor and Seibold 1993; Nagasundram and Bostrom 1994-1995; Nyerges and Jankowski 1998). Many of these later papers cite only earlier AST sources rather than Giddens.

AST has contributed to the IS literature in a number of important ways. Perhaps the most significant of these has been its role in pioneering the use of structuration theory, and,

by extension, of social theory more generally, in the IS field. It has done so, moreover, in a way that has established connections between structuration and mainstream IS research that have legitimated such work in the IS field and more broadly. This is evident from the continuing stream of AST studies, especially in areas such as GDSS and in the extent of citation of the original papers in the IS field and elsewhere.

Duality of Technology. The duality of technology (Orlikowski 1992) has been another influential approach to understanding the role of technology in structurational processes, which, like AST, has attracted a secondary literature (e.g., Brooks 1997; Pinsonneault and Kraemer 2002; Purvis et al. 2001) that does not necessarily reference Giddens.

Although she defines technology as “material artefacts (various configurations of hardware and software)” Orlikowski (1992, p. 403) seeks to avoid an “exclusive focus on technology as a physical object.” Rather, material artefacts are conceptualized as “the outcome of coordinated human action and hence inherently social,” being “created and changed by human action, [but] also used by humans to accomplish some action.” This is termed the *duality of technology*.

Technology is thus seen as “interpretively flexible,” although it is argued that this is often neglected in the traditional IS literature, which treats it largely as a “black box.” One reason for this is seen to be the “time–space discontinuity” of design and use of IS which typically occur in different organizations (those of the vendor and customer). It is also stated, however, that “interpretive flexibility is not infinite,” being constrained by the material characteristics of the technology, the institutional contexts of its design and use, and the power, knowledge, and interests of the relevant actors. Orlikowski depicts technology as reinforcing or transforming the institutional properties of organizations. Reinforcement is said to occur when users, perhaps unwittingly, “conform to the technology’s embedded rules and resources” (p. 411).

Orlikowski subsequently returned to the structurational analysis of information systems (Orlikowski 1996, 2000) adopting a quite different stance to that of her 1992 duality of technology paper. Thus, in her “practice lens” account, Orlikowski (2000) drew a distinction between the technological artefact and “technology in practice,” to argue that “technology structures are emergent, not embodied” (p. 407). Thus, while

a technology may be seen to embody particular symbol and material properties, it does not embody structures as these are only instantiated in practice...

[rather] through... repeated interaction, certain of the technologies properties become implicated in an ongoing process of structuration (Orlikowski 2000, p. 406).

Similar to AST, therefore, the duality of technology evidently provided a formulation of structuration theory that proved appealing to a significant number of IS researchers. Its wider influence is further indicated by its inclusion in Bryant and Jary (2001) as exemplifying the bold reconstruction of a research field. A particular feature of Orlikowski’s work has been her careful attention to in-depth qualitative studies as a way of illustrating and analyzing structurational processes. Her later work also demonstrates how a close reading of original texts can provide new insights that revise and extend previous theorizing.

Critical Engagement with Structuration Theory

This third strand of research rather than illustrating structurational concepts, or modifying structuration to incorporate technology, explores its limitations, especially in comparison to alternative theoretical approaches. This strand includes a number of reviews of the use of structuration in IS (referred to earlier) that, in addition to discussing how the theory has been used, have sought to highlight its potential, but also perceived weaknesses and gaps in the theory itself and the way it has been applied. Other research in this strand contrasts structuration theory with other theories, such as actor network theory (e.g., Berg 1998) or critical realism (e.g., Dobson 2001), that are seen to address its perceived deficiencies. A number of attempts have also been made to develop hybrid approaches with such theories. For example Rose and Lewis (2001) combine structuration with soft systems methodology, while Brooks and Atkinson (2004) propose an integration of structuration with actor network theory.

Compared to studies applying structuration, therefore, this work shows a more active engagement with theory—exploring and challenging its limits. In its comparison and combination with other theories, this work can also highlight new opportunities, for example, in addressing structuration’s lack of attention to technology, and connect structurational work with developments in other fields. Jones (1998), for example, explores the relationship between structuration and ideas from science and technology studies, arguing that Pickering’s (1995) “mangle of practice” provides a similar emergent and performative view of social action to that of structuration theory, while avoiding some of Giddens’s strong subjectivist assumptions.

How Has the Use of Structuration Theory in IS Research Changed Over Time?

Table 4 shows the distribution of papers in the categories discussed above over the period 1983 through 2004. Looking at the total number of papers published each year, it is evident that until about 1992, structuration was relatively little used in the IS field, being largely restricted to early forerunners of AST (Poole and McPhee 1983; Poole et al. 1986) and to papers applying structuration in an exploratory manner. This latter work may be linked to contemporary interests, in certain quarters, in the study of IS development and use as social action (Hirschheim et al. 1987; Lyytinen and Hirschheim 1989) and in interpretative methods (Boland 1985). By comparison, the larger number of papers from 1992 onward may be seen as an indication of a general acceptance of structuration as an appropriate theory for the analysis of IS phenomena and of a growing diversity in its use in the field.

Within the group of papers published since 1992 there has been a continuing stream of papers predominantly reporting the general application of structuration theory, albeit in new domains or for new types of information systems. There has also been a number of papers employing structuration in a more "sparing and critical" (Giddens 1991b, p. 213) way. These include studies using particular concepts from structuration or from Giddens's later works as well as more explicitly critical analyses, and may be seen as evidence of a growing sophistication in IS researchers' approach to the theory.

Comparing the relative number of papers between the various strands and subcategories illustrates the significance of AST within the overall picture and the small, but growing, number of papers that use concepts from Giddens's later writings. What this also highlights, however, is that the selective and critical treatment of structuration is a relatively minor component of the literature.

Finally, Table 4 illustrates the increasing number of structuration IS papers that are based on secondary literature, that is, the IS-specific versions of structuration, rather than on Giddens's own work. While in some ways this may be taken as a further indication of the maturity of IS researchers' use of structuration, it also suggests that a growing number of them may not be familiar with the original ideas on which it is based.

A general picture emerges from this analysis, therefore, of IS researchers' gradual acceptance of structuration as a legitimate approach in the early 1990s and the subsequent elaboration of a number of streams of structuration research in the

field. A more detailed analysis of the content and citation patterns within individual papers also suggests that, while these streams show some level of co-citation, in practice there is limited commonality or exchange between them, especially between AST and interpretive researchers. This lack of a clear cumulative tradition among structuration IS researchers, as a whole, may reflect a limited awareness of the extent and variety of structuration research in the field, that has, perhaps, only begun to be fully evident as a result of the current analysis. Further fragmentation of the literature, especially between AST and interpretive studies, may also be encouraged by epistemological differences and by divergent research foci: on the one hand, detailed studies of the use of particular IS, especially group (decision) support systems in experimental settings, on the other, an increasing attention to broader organizational and social issues, especially among those drawing on Giddens's later work.

The Influence of Structuration Theory on IS Research

From the above analysis, structuration theory may be seen as having influenced structuration IS research in a number of ways that illustrate different types of relationships between IS and social research. The studies identified in Table 4 as "applications of structuration concepts," for example, may be seen as illustrating how IS research draws on theories from other domains to address its particular concerns. In such research, the IS field is typically a relatively passive adopter of external ideas, not seeking to challenge or extend the original concepts but to show that they provide valuable insights on IS phenomena.

While such studies all generally seek (if, arguably, not always successfully) to employ structuration concepts in ways that follow Giddens's original account, they can vary in the specificity with which they do so. Thus, as was noted, a number of studies primarily focus on structuration's claim to transcend traditional dualisms, using this to support their rejection of determinist accounts of IS, of either the social or technical variety. No specific elements from either the dimensions of the duality of structure (Figure 1) or the features of structuration theory (Table 2) may be addressed in such papers, but rather the general principles of structuration are used to legitimize the theoretical stance of these authors.

Other studies applying structuration concepts do so in a more comprehensive manner, seeking to show that it is an effective approach in the study of IS. This may involve illustrating the operation of the dimensions of structure (Figure 1) in broad terms, perhaps supported by reference to

the duality of structure from Table 2. As was noted, such studies were more common in the early days of structuration's use in the IS field, when the case for its relevance to IS research was perhaps not as widely accepted, although some have continued to be published more recently.

A third group of papers applying structurational concepts do so more selectively, drawing specific connections between elements of the theory and particular IS phenomena. Specific issues, such as the knowledgeability of agents (e.g., Orlikowski 2002) or time-space distantiation (e.g., Ikeya 2003) from Table 2, may be addressed in such papers. Although IS researchers take a more active role in selecting the concepts and the IS phenomena to which they apply, as with the other "applications of structurational concepts," IS research is essentially a receiver of ideas from another domain, rather than an active partner in an exchange.

This balance shifts in the other two ways in which structuration may be seen as having influenced IS research. In the studies developing and applying an IS-specific version of structuration, for example, Giddens's ideas are generally treated more as a starting point than as a source of specific guidance. Here, structuration is seen as a language for describing the social forces influencing technologies and their use, and a source of concepts for understanding the processes involved. In terms of the relationship between IS research and social theory, this may be seen as illustrating how the field can take theories from another domain and modify them to its own purposes without necessarily referring to the original source in more than general terms. Features of structuration theory identified in Table 2 may thus be employed, but the consequent implications and issues tend to be largely unaddressed.

The studies identified as critically engaging with structuration theory, on the other hand, illustrate how IS research can use social theory as a starting point not for independent theorizing, but for analyses that seek to extend the original ideas to enable them to address significant issues that were previously overlooked or that have been foregrounded by use of IT. From this perspective, the absence of discussion of IS phenomena in Giddens's work is seen to reflect his lack of attention to particular topics rather than that structuration theory is necessarily incapable of addressing them, or requires radical adaptation to do so. At the same time, a few of these studies take on board some of the critical literature on structuration that suggests that in certain areas, such as his anti-objectivism and treatment of constraint, Giddens's position goes farther than his own description of structuration theory would suggest is necessary. Many of these papers address debates highlighted in Table 2. For example, Berg

(1998), Jones (1998), and Rose and Truex (2000) critically discuss Giddens's treatment of materiality, while Ciborra and Lanzara (1994) and Orlikowski (1996) offer different accounts of Giddens's treatment of change.

The influence of structuration on this type of work is significant, as it tries to retain certain key features of structuration theory, identified in Table 2, but also to find ways that their implications can be reconciled with research specifically focused, in many cases, on the design and use of material technological artefacts. To the extent that IS researchers are successful in this endeavor, then, it offers an important opportunity to promote a mutual exchange between IS research and social theory, as Orlikowski and Barley (2001) have suggested would be desirable with respect to organization studies. Given the increasing degree to which IS are seen to be implicated in contemporary social phenomena, this opportunity would seem highly significant in terms of current debates about the status of IS as a reference discipline and its legitimacy as a research field (Baskerville and Myers 2002, Lyytinen and King 2004). Developing structurational research in the IS field that connects directly with themes and understandings in other fields may facilitate mutual interaction.

These various types of influence are compared in Table 5 in terms of their relationship with the features of Giddens's structuration theory (as summarized in Table 2)

Only a small proportion of IS research would thus appear to have engaged closely with more than a few features of Giddens's work. Rather it has been employed predominantly as a source of general principles or specific concepts, sometimes with little reference to the original ideas. What this may mean for the character of structurational research and for the use of social theory in the IS field is explored in the next section.

The Relationship Between Structurational IS Research and Giddens's Work

Although all the studies identified in this review either cite Giddens directly, or identify themselves as employing structurational ideas via AST or the duality of technology, few of them show a close relationship between their theoretical stances and Giddens's original formulation of structuration theory. In itself, this is not necessarily a problem. As has been shown, Giddens's ideas are open to a number of criticisms and, it may be argued, need to be adjusted or extended to address IS phenomena more effectively. Such changes, however, need to be made with due recognition of their implications, if claims with respect to the structurational character of the consequent approaches are to be sustainable.

Table 5. The Influence of Structuration Theory on Different Strands of Structural IS Research

Strand of Structural IS Research	Influence of the Key Features of Structuration Theory (Identified in Table 2)		
	Duality of Structure	Other Features in Table 2	Features Contested by Giddens's Critics (Identified by shading in Table 2)
Application of structural concepts	as means of transcending dualisms	limited	limited
	as principle to be illustrated	limited	limited
	as background to specific analysis	as possible source of concepts to be illustrated	as possible source of critique
Development and application of an IS-specific version of structuration theory	as source of general concepts	limited	limited
Critical engagement with structuration theory	as possible focus of debate	as possible source of concepts to be contested/ extended	as source of critique

For example, IS research that claims, by reference to Giddens, that it avoids both social and technological imperatives (Markus and Robey 1988) needs to have an emergent ontology that does not assume deterministic relationships between organizational change and either social or technological "factors."

It would seem helpful, therefore, to identify the nature and extent of the differences that may exist between Giddens's position and that adopted by structural IS researchers to assess the implications for the claims that they might be able to sustain. Broadly speaking, these differences can be split between those that relate to Giddens's comments on the general types of research that structuration theory is suited to, and those that relate to specific features of the theory.

In terms of the types of research to which structuration is suited, two particular features of Giddens's views would seem to be potential areas of difference. The first of these is relatively trivial and relates to his preference for the selective use of his ideas, rather than applying structuration as a whole. IS research employing structuration, or elements of it, in a discriminating, rather than wholesale, fashion would seem to reflect Giddens's thinking more closely. Since this reflects Giddens's preference, perhaps because selective use would seem likely to be more reflexive, and has no evident theoretical implications, it would not seem a major consideration in terms of a future structural research agenda in the IS field.

Of greater significance, however, would seem to be Giddens's comments on the fundamentally hermeneutic character of social research, the implausibility of generalizable social laws, and his criticisms of naturalism and objectivism. IS research that focuses on observable facts to the neglect of social actors' knowledgeability and reflexivity, that seeks to employ structuration in pursuit of invariant social laws, or, more generally, that assumes an epistemological equivalence between the social and natural sciences is at odds with central principles of Giddens's position and would seem to risk missing some of its key insights.

The specific differences between structural IS research and Giddens generally relate to how researchers have addressed, or not, particular features of structuration (Table 2). For example, some of the studies identified as applying structuration to IS research have presented structuration as an episodic, rather than a continuous, process. Thus, Newman and Robey (1992) analyzed information systems development in terms of a series of episodes and encounters. While this may make it easier to study processes that, by definition, occur continuously over time, it risks overlooking both the agency involved in the reproduction of structure and the potential for change in every instant of action. Moreover, this punctuated view neglects the way in which gradual change may be happening all the time, perhaps never being sufficiently notable to be identified as a specific event (as Karsten [1995] and Karsten and Jones [1998] illustrate). Some of the power of the structural perspective is, therefore, in danger of being lost in such analyses.

These differences are probably most marked in the IS-specific versions of structuration theory. A number of authors (Banks and Riley 1993; Iivari and Lyytinen 1998; Jones 1999; Poole and DeSanctis 2004; Pozzebbon and Pinsonneault 2001) have noted that AST diverges significantly from Giddens's position in a number of areas. In particular, AST's view of *structure within technology*, its identification of other independent *sources of structure*, and its concept of a dialectic of control between *the group and the technology* would seem inconsistent with Giddens's position that structure is virtual, existing only in its instantiation; that it does not have independent sources, but is the indivisible medium and outcome of the reproduction of practices; and that the dialectic of control is between (human) agents. The extra concepts, such as *spirit* and *appropriation*, employed by AST would also appear to reify what for Giddens are purely analytical constructs. A number of aspects of the duality of technology would seem similarly at odds with Giddens's account of structuration.

Differences from Giddens's views are also evident in some of the literature identified as critically engaging with structuration theory, especially where this has involved attempts to combine structuration with other theories. For example, the integration of structuration and actor network theory proposed by Brooks and Atkinson (2004) introduces an additional dimension into the structure/agency duality that they term the emancipatory structure. This is seen as interacting with a dimension of agency that they refer to as translation (following Callon 1986) through a modality of problematization. Quite apart from the issue of combining structuration with a theory that Latour (1999, p. 16) explicitly describes as "bypassing" the structure/agency debate (because it reflects a modernist position that actor network theory rejects [Latour 1993]), the original dimensions of Giddens already allow for emancipatory change in every instant of action. Such an extension would therefore seem tautological.

A number of papers—notably Orlikowski (2000), but also Jones (1998), Yates et al. (1999) and Rose, Lindgren, and Henfridsson (2004)—explore how structuration might be extended to better address information systems in ways that seek to remain largely consistent with the key features of Giddens's theory. While the particular ways in which these papers propose that structuration could be applied or modified may not be entirely in keeping with Giddens's ideas and are not without their own limitations, they nevertheless suggest that structurational approaches in the IS field do not need to start by rejecting central features of Giddens's theory.

In considering the future agenda for structurational research in the IS field, therefore, it will be argued that studies seeking to employ Giddens's ideas in a sympathetic, but critical, fashion represent an important, and so far relatively under-

explored, area. This situation may be seen as analogous to that described by Whittington (1992, p. 698) when reviewing the use of Giddens in management research, where he commented that,

it is strange, both that his directly relevant work on organizations and management seems to have been neglected and that his more general structurationist perspective has [often] been interpreted in a [rather] limited sort of way.

Remedying the neglect of relevant work and providing a fuller interpretation of structuration theory would therefore seem a significant opportunity for future research.

It is recognized, however, that this is at odds with the recent prescriptions of two of the leading exponents of structuration in the IS field (Poole and DeSanctis 2004), who proposed an agenda heavily oriented toward deterministic, functional research, especially around AST. Before setting out this research agenda, therefore, it would seem necessary to consider why consistency of structurational IS research with Giddens's ideas (or indeed of any IS research with the reference theories on which it draws) should be of any concern to IS researchers.

This question may be considered from two perspectives: first, the implications of inconsistency, and second, the potential benefits of adopting a consistent position. With respect to the effects of adopting positions that conflict with Giddens's own, perhaps the most significant relates to the dependency of many of the main claims of structuration theory upon the particular perspective he adopts. Thus the argument that structuration is able to transcend traditional dualisms involves an explicit rejection of functionalism and determinism (and also of purely hermeneutic approaches), which means that studies adopting the rejected positions cannot reasonably make similar claims by reference to Giddens's work. More specifically, the particular properties attributed to structure, such as its ongoing production and reproduction through action, depend, in Giddens's perspective, on his definition of the term. Other approaches treating structure in ways that do not fit with Giddens's definition, therefore, cannot necessarily assume that their concept of structure will share these properties. At the very least, this would seem to require that the basis for any claims of equivalence between the concepts in studies that do not follow Giddens's position should be explained, as Porpora (1989) seeks to do for the realist concept of structure, rather than taken for granted.

A perhaps more esoteric, but, it may be argued, no less important, concern is that of the philosophical or logical consistency of the stance adopted. Thus, researchers who suggest

that structures, at different times, or in different circumstances, are both created only in the instance of action and can be embedded in technology, need to account for this ontological inconsistency (something that endures within a material technology cannot have the same form of existence as something that exists in the memory traces of social actors and comes into being only when technology is used). Similarly, researchers who employ structuration in ways that imply an ontological position at variance with Giddens's position need to be able to show, as Layder (1987) sought to do, that their stance is consistent with that adopted by Giddens, notwithstanding his arguments to the contrary.

Finally, given the substantial theoretical and philosophical infrastructure associated with structuration theory, advocating its use primarily because of its focus on *structure*, would seem to neglect important aspects of the theory, especially as Giddens adopts such a distinctive meaning for the term. If what is being sought is a theory that takes structure seriously, then there would seem better candidates available that do not bring with them structuration's theoretical overhead. For example, Kling and Zmudianas (1994), propose Mintzberg's typology of organizational forms.

Thus, as Murray et al. (1995) argue, theory borrowing between disciplines needs to involve more than the selective transfer of concepts. A theory, they propose, following Fuhrman (1980), has a substructure of values, interests, sentiments, and assumptions, reflecting the cognitive interests and social context out of which it was developed, that underlies what is immediately evident from a description of the theory. Overlooking these social roots of theories, Murray et al. argue, increases the potential for researchers to be misled. If IS researchers' use of structuration (or of any other theory borrowed from another discipline) is to avoid such problems, then its underpinning assumptions should not be lightly discarded. Seizing on appealing concepts or apparent terminological similarities (e.g., the use of the word *structure*) without appreciating the underlying arguments risks losing essential features of the borrowed theory. While a complete understanding of every original theory may be infeasible, close attention to key claims of leading exponents, as the first section of this paper sought to illustrate, rather than a reliance on secondary sources would seem necessary to the development of such an appreciation.

Three positive benefits of IS research being broadly consistent with Giddens may also be identified. The first is simply the opportunity for more thorough exploration of the insights offered by Giddens's ideas in their own terms. A second benefit of consistency may be seen as the possibility of connecting with debates in other research fields. Thus writers

such as Bryant and Jary (2001) in sociology, Pozzebon (2004) in strategy research, and Pickering (1995) in science studies have identified structuration as a fruitful, and potentially powerful, approach. While not all of this research has necessarily followed Giddens to the letter, the opportunity for engagement across disciplinary boundaries would seem greater if based on a common understanding, for which Giddens's own position would seem the most appropriate starting point. This may reduce, if not necessarily eliminate, the problems of communication that would seem likely to arise if each field adopts its own translation of the original ideas.

The third potential benefit would be the opportunity, discussed earlier, for IS researchers to contribute to theory development in ways that do not involve the outright rejection of significant elements of Giddens's ideas. As has been noted, Giddens has said very little that might be seen as relating to the role of IS and some of the few comments he has made would seem rather simplistic from an IS perspective. If IS researchers were able to show how Giddens's ideas might be sympathetically extended to address significant IS-related issues, then this could be a valuable contribution to general understanding.

It is important to stress, however, that in suggesting that there may be benefits for the IS field in pursuing research that seeks to be consistent with Giddens's writings, the aim is not to imply that Giddens is infallible, or that structuration, as Giddens presents it, is the only, or best, social theory applicable to the study of IS. Certainly, the complexity of the IS field and the diversity of topics addressed within it would suggest that no single theory would be feasible or, arguably, desirable.

Rather, seeking to work through the implications of Giddens's position does not exempt his work from critical attention, but exposes it to greater scrutiny. If empirical studies identify limitations of Giddens's ideas, then this is more powerful if they have sought to be consistent with his position, rather than if they have started from an alternative standpoint. As Murray et al. argue, extensions or adaptations of a theory that engage critically with, rather than reject, its intellectual substructure would seem likely to be able to make a more effective contribution. This does not mean that only work that is entirely consistent should be allowed. As Whittington (1992, p. 700) notes, "there is no need for theological purity"; rather, researchers need to be aware of inconsistencies and their implications and be able to show how the necessary changes to the claims that can be made with their approach can be considered as being compatible with the "values, interests, sentiments and assumptions" of the original theory.

Table 6. Opportunities for Future Structural IS Research

Area	Research Opportunity
Lack of cumulative research tradition	Studies that build on, rather than repeat, earlier research
Limited interpretation of Giddens's work	Studies that seek to explore structuration in more depth through sympathetic but critical engagement with Giddens's work
Uneven coverage of different structural (and related) concepts	Studies that address aspects of Giddens's work that have been relatively neglected in IS research (especially where these relate to phenomena in which IS are seen to be implicated)
Limited attention to social and institutional context	Studies that address structural processes in broader contexts than just the specific organizational setting
Predominance of studies in contexts where social actors' agency is considered to be strong	Studies in contexts that are generally considered to restrict structuration
Lack of a consistent structural account of technology	Studies that explore how technological artefacts can be addressed from a structural perspective, without abandoning its central claims
Limited use of other structural theorists	Studies that explore the insights of other structural theorists such as Bourdieu and Bhaskar
Limited reflexivity of much IS research	Studies that address the structuration of IS research

In drawing attention to the discrepancy between significant strands of structural IS research and Giddens's work, moreover, the intention is not to decry these efforts, nor to suggest that they should be proscribed. Such research is well-established and evidently provides important insights in certain fields, with, as Poole and DeSanctis (2004) cogently argue, considerable scope for further contributions. The present analysis does not seek to dismiss such claims, nor is it in any position to do so; rather, it suggests that philosophically, methodologically, and conceptually these contributions are largely independent of structuration theory, as Giddens defined it. At the same time, the analysis suggests that there is a significant research agenda to be pursued, complementing that proposed by Poole and DeSanctis (2004), which does not involve abandoning key tenets of Giddens's theoretical position. What this might look like is discussed in the next section.

An Agenda for Structural IS Research

Whittington (1992, p. 707) concluded his discussion of the use of structuration in the management field with the observation that "Giddens has still not been fully put into action." Our analysis suggests that IS research may similarly be failing to take full advantage of the potential of Giddens's work in a number of respects. Thus Table 4 suggests that structural-

research has shown little in the way of a cumulative research tradition and has often focused either on the IS-specific versions, especially AST, or on structuration as a general approach to the neglect of more specific aspects of Giddens's work, including those from his later writings, that may arguably be more relevant to the study of IS phenomena. Similarly, Table 5 suggests that the implications of many features of structuration shown in Table 2 do not appear to have been widely addressed. Nor has structural IS research taken much advantage of opportunities to engage in critical debates on aspects of Giddens's work where it might be expected to offer particular insight, such as the scope of agency in well-ordered social settings, and the role of technology. Further exploration of the work of other structural theorists, such as Bourdieu and Bhaskar, whose work has received far less attention in the IS field may help to inform such critical engagement with Giddens's approach. Finally, structuration theory may be applied, reflexively, to IS research itself.

As Table 6 shows, there is a substantial agenda to be pursued in putting Giddens more fully into action in IS research. Given the character of his theorizing, however, it would be inconsistent to present this in the form of testable propositions; rather, examples of potential research topics that might address particular theoretical issues will be described.

The relative lack of overall coherence or cumulative development in structural IS research is evident not just in the

emergence of separate, frequently noncommunicating, streams of research as shown in Table 4, but also in the persistence, more than 20 years after the publication of the first IS-related structuration articles, of papers whose primary contribution would seem to be in demonstrating that structuration concepts can be "applied" to the study of IS phenomena. While these papers can add to the literature by addressing new domains or exploring more subtle insights, the suitability of structuration as a vocabulary for understanding IS phenomena should, if previous research is accepted as valid, by now be a matter of record. The need for further papers reiterating this message in established settings would therefore seem limited.

Taking work "applying" structuration forward, therefore, would seem to require a greater awareness of the existing literature and a focus on IS phenomena and settings in which structuration provides distinctive insights, rather than simply showing that the ideas can be applied in IS contexts. For example, structuration theory would seem a potentially useful way of understanding work practices in emerging contexts such as ubiquitous information environments, or in virtual teams where information and communication technologies are mediating traditionally face-to-face interactions, and issues of time-space distancing may be expected to be highlighted. To the extent that the present paper gives a fairly full picture of structural IS research to date, enabling researchers to appreciate the scope and orientation of prior work in the field, it is hoped that it may help to support this more cumulative research practice.

If the argument of Murray et al. (1995) that researchers need to recognize a theory's substructure as well as its more evident conceptual superstructure is accepted, then putting Giddens more fully into action would also seem to require a more thorough appreciation of his work than is evident from some IS research. As Table 5 illustrated, awareness of, and sensitivity to, the implications of key features of structuration theory is quite limited in many IS studies. Thus there would seem considerable opportunity for advancing research on IS phenomena that addresses them in Giddens's own terms, without recourse to concepts such as structures embedded in technology. While it is beyond the scope of this paper to offer a full account of what this might involve, some general characteristics may be suggested from consideration of a hypothetical example of a workflow system. Rather than seeing such a system as imposing a single way of working, embedded in the technology, on passive employees, from Giddens's perspective, how work is carried out with the system would depend on how the employees choose to use the technology in their specific setting, which might not conform to the intentions of the designers or the managers imple-

menting it. Even if the system provided detailed activity tracking (such as keystrokes, task durations, etc.) such that it was strongly implicated in organizational control, employees might find ways to ensure that performance levels appeared satisfactory without necessarily delivering the expected outcomes (for example, either through extra work to compensate for discrepancies between what the system monitors and what is needed to get the job done, or by adjusting work practices to optimize performance measures for minimum effort). Its effectiveness in standardizing and controlling work practices would also depend on management's ability to access and use the performance data in a timely manner. Giddens's position would thus emphasize the need for researchers to focus on the practices associated with technologies in specific settings rather than assuming that these follow unproblematically from the intentions of designers or implementers and to consider employees as active agents, even in their submission to monitoring.

A fuller appreciation of Giddens's structural ideas would also suggest that there may be opportunities in addressing other aspects of Giddens's work that appear to have been under-explored in the IS field. For example, examining the ongoing (re)production of structure and ontological security (as contributors to "resistance" to change) and recognition and investigation of unacknowledged conditions and unintended consequences (that designers or implementers may not have considered in their plans) may provide insight on why information systems projects often fail to achieve the benefits expected of them. Similarly, study of routines associated with the use of an ERP system could be used to explore how these may vary between individuals and over time, but also how they sustain and shape individual and organizational identity. Structural concepts, such as the temporal and spatial patterning of social practices may similarly provide insights on remote working, or practical consciousness on knowledge management. Such focused studies would also be in keeping with Giddens's recommendation of selective use of his work.

Given Giddens's claim that all his writings are part of a single intellectual project, remedying the relative neglect of his later writings in IS research would seem another important element in developing a fuller structural understanding of IS phenomena, especially as it is here that Giddens addresses recent social changes in which IS are increasingly implicated. Work in this area might look at the disembedding of social relations from local contexts of interaction (Giddens 1990), for example, through the use of the Internet to sustain social interactions on a global scale, or the increasing dependence of modern societies on technological systems, for example, inter-bank funds transfer systems, whose operation is largely invisible to consumers and whose reliability and security has to be taken on trust.

Another aspect of structuration theory that would seem deserving of more attention in the IS literature is its linkage of individual micro-level action and macro-level institutional processes. In this it may support efforts, as advocated by Orlikowski and Barley (2001), to broaden the scope of IS research from its traditional focus on phenomena associated with computer-based information systems at the individual, group, and organizational levels, to address the broader institutional and social developments in which IS are increasingly implicated (which would also, as Whittington notes, be more in line with Giddens's own position). Such research, for example, might examine how the characteristics of national healthcare systems influence the adoption and use of electronic patient record systems, or how the use of employee e-mail monitoring is related to broader structures of domination in the workplace and society. This would not imply an abandonment of interest in individual and group work practices, however. As Giddens argues, it is a matter of emphasis: institutional (macro) analysis and (micro) analysis of strategic conduct are not mutually exclusive, indeed each "has to be rounded out by a concentration on the duality of structure" (Giddens 1984, p. 288).

While there may be considerable benefit for IS research from closer attention to Giddens's ideas, there would also seem to be a number of opportunities to explore their applicability in contexts in which structuration theory has been challenged by critics. It is a central tenet of Giddens's argument, for example, that structuration occurs continually, in all settings (even if this serves primarily to reproduce, rather than transform, existing structures). Much structurational IS research, as was noted earlier, however, has tended to concentrate on systems such as computer-mediated communication and groupware, or on information systems development and organizational change, where the scope of actors' agency and *interpretive flexibility*, and hence the potential for them to shape the structures that shape their actions, is seen to be relatively high. A particular challenge would, therefore, seem to be to investigate settings that appear to restrict agency, for example, studies of transaction-processing systems or ERP systems, or of implementation and use in highly controlled contexts, such as safety-critical systems or call centers. Showing that structuration offers useful insights in such "difficult cases" would provide strong evidence of the theory's value. Although neither offers a specifically structurational account of IS, the work of Feldman and Pentland (2003) on routines as a source of change and of Boudreau and Robey (2005) on the scope for human agency in the use of ERP systems illustrate that such an avenue is possible.

A perhaps even more ambitious objective for structurational IS research would be to contribute to the development of a

consistent theoretical account of the IT artefact, of the type that Orlikowski and Iacono (2001) have identified as lacking in the IS field. Giddens's own writing, as has been noted, provides almost no guidance on what this may involve, although his comments in Giddens and Pierson (1998, pp. 82-83) on technology being implicated in human action and humans "do[ing] things in relation to machines" would seem to indicate that he recognizes that there is some interaction between technology and human action that may be significant for social practice. Understanding this interaction, and the conceptualization of the IT artefact that it implies, would seem a particular opportunity for IS researchers in the light of Giddens's own neglect of this topic.

While it is beyond the scope of this paper to develop such an account, some of its potential elements may be identified. For example, the concept of affordances (Gibson 1979), the "actionable properties between the world and an actor" (Norman 2004) is proposed by Hutchby (2001, p. 453) as offering an understanding of the relationship between material technology and social action in terms of "limits on what is *possible* to do with, around, or via the artefact" that would seem similar to Giddens's view of constraint. Thus technology is not seen as determining action, but rather as defining a space for potential action, the boundaries of which may, or may not, be significant to its use in any particular setting. Another possible element might extend Orlikowski's "practice lens" (2000) by developing a more thoroughgoing practice-based, or praxiological (Reckwitz 2002), approach to the study of IS, that would address not just the enacted, emergent, and situated character of technologies-in-use, but also the embodied, and affective character of use practices. A third element might involve a focus on agency (Rose, Jones and Truex 2005), both human and material, recognizing not only their differences, but also their mutual intertwining. Rather than seeking to isolate discrete influences of technology on social practices, or vice versa, therefore, the focus would be on the agency of the ensemble as it is instantiated in practice.

Recognizing that the work of Giddens has perhaps disproportionately influenced structurational IS research, there would also seem an opportunity for further exploration of the work of the other structurational theorists, such as Bourdieu and Bhaskar. While there has been some work drawing on these theorists in the IS field (Kvasny and Truex 2000; Mingers 2004; Schultze and Orlikowski 2004), there has been limited attention to their structurational insights. Such research might help to redress the impression that Giddens is the only structurational theorist and the sole reference point for structurational research. Moreover, since, as has been noted, their work adopts a rather different stance from

Giddens on a number of key issues relevant to information systems, especially the virtual status of structure and the extent of individual agency, they may provide a more fruitful basis for the development of the structurational account of technology discussed earlier.

A final aspect of Giddens's ideas that would seem deserving of greater attention relates to IS research itself, rather than how and what it studies. Thus, the knowledgeability and reflexivity of social actors is a major theme of structuration theory and Giddens also introduces the concepts of discursive penetration and the double hermeneutic whereby social actors' own accounts and the products of social research become part of individuals' understanding of their own condition. This would seem to have been addressed in only a limited way in IS research, either in terms of how IS research findings shape the understandings of our research "subjects," or of the knowledgeability and reflexivity of IS researchers themselves. While some reflexive accounts of IS research have begun to emerge (e.g., Schultze 2000), there would seem to be considerable opportunity for IS researchers to consider the structuration of their own research practice. Boland and Lyytinen (2004) provide an illustration of what this might involve in their discussion of how IS researchers' practice shapes, and is shaped by, the IS phenomena that they study. This is also the case, of course, in the writing of review articles of this sort. It would, therefore, seem appropriate that we acknowledge how our analysis has been influenced by our own understanding of structuration theory and our interest in engaging closely, but not uncritically, with social theory in our own research. Taking this reflexive mode further, we may note how the research analyzed in this paper is also subject to structuration. Thus, we might consider how structures of legitimation, domination, and signification are instantiated in the way that structurational research has developed over time—how, for example, structures of domination have built up around AST to sustain its prominent position in the field, how IS researchers' use of social theories legitimizes and transforms them, or how the language of structuration has permeated (or not) IS research practice.

Summary

The eight areas for future research identified above are not intended to be seen as offering a complete, or necessarily coherent, account of the potential of structurational research in the IS field, but as drawing attention to aspects of structuration theory, especially as developed by Giddens, that appear to have been relatively neglected in previous IS research. Nevertheless, three broad themes connecting these areas may

be identified that suggest specific aspects of Giddens's work, the implications of which do not seem to have been fully explored in IS research so far, and that would seem to deserve greater attention.

Fundamental to Giddens's position is the pervasive, ongoing mutual constitution of structure and agency. Structurational IS research has, arguably, paid insufficient attention to the continuous operation of agency, the mutuality of constitution, or its pervasiveness. Thus the persistence of agency would suggest that IS researchers need to be sensitive to actors' roles in sustaining and modifying settings, perhaps especially in those that are considered to be unchanging (and, perhaps, unchangeable). The intrinsic interconnection between social actors and social institutions suggests that researchers need to pay equal attention to how individuals contribute to organizational and social power relationships, norms, and meanings, and to how individual practices are shaped by these, rather than privileging one or the other or focusing only on those structures most immediately evident in the specific setting. The extent and variety of structurational processes in which IS may be significantly implicated, from individual identity maintenance through the temporal organization of work practices to the development of globalized high modernity, suggests a broader spectrum of potential topics and levels of analysis than IS researchers have traditionally studied. Tracing the dynamics of these interactions and their interconnectedness would seem to provide a significant challenge for IS research.

The second aspect that would appear to merit further investigation is the implications of Giddens's less evidently structurational work. Although this is sometimes focused on individual or societal level phenomena that may seem less immediately applicable in organizational settings and its theorization can be abstract and generalized, Giddens's claim of the underlying coherence of his writings suggests that this work may be an under-developed resource for IS researchers. Studying concepts such as time-space distanciation or disembedding, in which IS are identified as playing an important role, would seem a first order response to this apparent gap, but there may also be opportunities for further research in areas such as self-identity, risk, and institutional reflexivity, exploring, for example, how a particular technology such as a mobile e-mail device, is seen to be involved in shaping (and being shaped by) the identity of its users, or how different types of IS are implicated in changing risk perceptions in particular settings, such as air travel.

Finally, the agenda (and the analysis on which it was based), points to the need for a more reflexive IS research practice, one that engages closely, but not uncritically, with social

theory addressing the substructure of borrowed theories as well as their more immediately appealing concepts, and that is aware of its own structuration and its own history. Recognizing, too, the knowledgeable ability of social actors and the double hermeneutic whereby researchers' theorization of phenomena can become part of their research subjects' understandings, would suggest a need for sensitivity to the reflexivity of practitioners.

Conclusions

The analysis presented in this paper has shown that the work of Giddens, and especially his structuration theory, has been cited substantively in more than 330 IS papers to date, including, contrary to the claims of critics such as Gregson (1989) and Archer (1990), many empirical studies. This would seem to indicate a significant level of interest in Giddens's work in the IS field and to attest to the existence of a sizeable number of IS researchers seeking to engage seriously and constructively with social theory (cf. Mingers and Willcocks 2004; Orlikowski and Barley 2001). That the number of citations is generally continuing at a high level, more than 20 years after the first IS-related paper drawing on structuration theory, also suggests that this is more than a passing interest, a temporary fashion.

From an IS perspective, it would seem that structuration offers a number of distinctive concepts and positions that are appealing to researchers in the field. This would seem to be the case, notwithstanding a number of significant features of the theory that are potentially problematic in an IS context, and Giddens's own lack of attention to, or apparent interest in, technology, in general, and IS, in particular.

At the same time, it may be argued, as Whittington (1992) observed with respect to its use in the management field, that IS researchers have adopted Giddens's work in a limited and atypical way. From the point of view of some of the leading figures in structural IS research, this is an inevitable consequence of what are perceived to be limitations of Giddens's position, which need to be significantly reconceptualized if structuration is to be aligned with mainstream positivist, quantitative IS research (Poole and DeSanctis 2004). While such research has its own logic and motivations, it has been an argument of the analysis presented in this paper that there are also significant opportunities for structural IS research that builds on Giddens's ideas, rather than starting by setting a number of his central arguments aside. Putting Giddens into action in this way may involve either quantitative or qualitative studies across a range of IS domains, but seeks to retain or critically engage with key fea-

tures of Giddens's thinking rather than discarding them *a priori*. In seeking to take into account the "substructure of values, interests, sentiments and assumptions" (Murray et al. 1995) on which structuration is based, such research has the potential not just to advance theory borrowing in the IS field, but also to support reciprocal exchange with other fields that have similarly sought to apply structuration in their work.

In focusing in such detail on the work of one particular social theorist, the intention has not been to suggest that structuration theory, as Giddens defines it, should be the preferred approach to the study of IS. As has been argued, the complexity and diversity of the field would suggest that a variety of theories (not just from the social sciences) are likely to be needed. Rather the aim has been to illustrate, using the example of Giddens's structuration theory, how the IS field has engaged with social theory.

A number of conclusions may be drawn from this. First, it can be seen that IS researchers using structuration theory have done so in a wide variety of ways. Social theories are thus not necessarily applicable only to one particular topic. Indeed it is argued that IS researchers should seek to explore the full scope of theories they borrow from other disciplines rather than restricting themselves to a few concepts that are apparently most directly applicable to their work.

A second finding of the analysis is that some structural IS work has adopted a rather narrow interpretation of Giddens's work, both in terms of the aspects they make use of and the way in which they employ it. While IS researchers should not consider themselves unable to challenge, adapt, and extend the work of social theorists, if they are to do so, then this needs to be on the basis of a rich understanding of both the substantive content of the theory and its substructure. Such an understanding would seem to require a careful reading of original writings and critical commentaries rather than solely relying on secondary sources within the IS field. This might help, for example, to avoid superficial similarities of terminology (such as the use of a term such as *structure* in this instance) being viewed as evidence of more fundamental congruencies.

A particular outcome of this analysis has been to suggest that IS researchers' use of structuration theory has addressed only a small part of its potential and that significant further insights would seem possible through the careful, but critical, exploration of Giddens's ideas. To the extent that such selective use is also evident in the way that other borrowed theories have been employed by IS researchers, then they may also benefit from a similar analysis. For example, one such relationship is the technology acceptance model's (Davis 1989) use of the theory of reasoned action (Fishbein and Ajzen 1975).

Pozzebbon and Pinnsonneault (2005) identified IS researchers as having made a significant contribution to empirical structural research in the management field, and further evidence of this would seem to be provided by the range and variety of studies reviewed here. If the IS field is to maintain, and even extend, this contribution, then it has been the argument of this paper that this should be possible in ways that are based on a close engagement with Giddens's ideas. This would not be to privilege Giddens specifically, but, in focusing on a close and systematic exploration of his work, to illustrate how social theory can be effectively and fruitfully drawn on in IS research.

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GIDDENS'S STRUCTURATION THEORY AND INFORMATION SYSTEMS RESEARCH¹

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Appendix

Information Systems Research Papers Discussing Giddens

Application of Structural Concepts

Application of Structuration in General

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