Preface

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The papers in this special issue of the Journal of Intelligent Systems are the result of an invitation to a number of researchers to address issues concerned with the 'social contexts of intelligent systems'. A definition of what 'the social contexts of intelligent systems' might consist of was not provided in the original invitation to participate; rather the intention was that 'the social contexts of intelligent systems' would be defined in and through the work of those in the field. Correspondingly, the papers contained in this special issue are grounded in a number of disciplines and reflect a wide range of methodological and theoretical frameworks. Contributions draw on, variously, sociology, artificial intelligence and cognitive science; and represent theoretical discussion, case studies, and examples of system design.

The background to the special issue lies in two previous research meetings. The first was a workshop focusing on the relationship between interactive system design and sociology, held at the University of Surrey, under the working title *Computers and Conversation Analysis*. The aim of the workshop was to look at how "the work done by sociologists studying the everyday conversations that people have

with each other [could be] relevant to designers of computer software” /1/; the result was a collection of research contributions which explored alternatives to cognitive science and AI in the interfacing of people to systems. Many of these papers employed conversation analysis, a sociological approach to the analysis and description of human interaction. One link from that meeting to this special issue is through several authors' reexamination of the benefits of conversation analysis for design, and an extension of work in conversation analysis and system design.

The second meeting was a symposium on *Complex Systems, Ethnomethodology and Interaction Analysis*, held at AAAI, Boston 1990 /2/. The contributions to that symposium, whilst still focusing on the relationship of sociology to design, addressed broader issues of how the methods and findings of interpretive sociology generally (including, but not only, conversation analysis) could “be brought to bear on the dialog and interaction between 'intelligent agents', both complex systems and human beings”.

This special issue of the *Journal of Intelligent Systems* develops and generalises these issues to discuss, broadly, 'the social contexts of intelligent systems': the assumption which underlies all of the papers in the issue is that systems are designed, developed, used and evaluated in a social context, which comprises not only 'practical' and substantive features (human action, physical surroundings, and organisational constraints) but conceptual structures (human assumptions, beliefs, understandings, interactions).

The exploration of social context in the papers in this special issue is often avowedly sociological, drawing on concepts from two

particular types of sociological enquiry which were the focus of the two previous meetings. The first is *ethnomethodology* which aims to investigate the reasoning strategies used by individuals to make sense of the world and each others' actions. Ethnomethodology investigates the nature of 'commonplace' or 'everyday' reasoning: reasoning exhibited when, for example, individuals read a map, do mathematics, or walk across a crowded street. On the basis of these investigations it is suggested that human action and interaction does not simply 'happen', but is an 'accomplishment' in the sense that it is the result of collective effort to produce and understand it.

The second line of relevant sociological enquiry is *conversation analysis*, which focuses ethnomethodology's concerns and examines in detail natural language interaction, describing the regularities which demonstrate the use of similar reasoning strategies in the details of human conversation. Conversation analysis takes as its departure point the observation that any individual can interact more or less successfully with any other. This 'mutual intelligibility' is possible, conversation analysis suggests, because of the fact that interaction is based around *common structures*; the effortless way in which we can argue, accuse, lie, persuade and any number of the other activities we conduct through language, are thus based on a recognition (at a tacit, 'unconscious' level) of the structures around which these activities occur (see Thomas /3/ for a review of work in conversation analysis applied to interactive system design).

The way in which ethnomethodology and conversation analysis are employed in the papers in this special issue is intended to be comprehensible to a multidisciplinary audience who are approaching these issues from a distance, or for the first time. For example, Bob

Anderson, Graham Button and Wes Sharrock, in their paper "The Social Organisation of Design Work" employ sociological methods and findings to look at the 'substantive features' and 'conceptual structures' involved in design work. They distinguish between three 'dimensions' of the design process: 'design-in-organisation' (the social context as the organisation in which designers work); 'design-in-interaction' (the social context as communicative actions between co-designers); and 'design-in-sequence' (social context as the steps required in design processes). Using a case study of software development for a network printer, their analysis of these three dimensions of design activity suggests that it is the features of the social context of design which *determines* designers' activities and the ways in which they will undertake them, and *constitutes* those activities and the way they are undertaken.

Anderson, Button and Sharrock's paper is an exemplar of the ways in which the concerns of interpretive sociology can be employed to examine issues in system development. As they suggest, their work reframes the observation by Lucy Suchman /4/ that social and contextual factors profoundly affect humans' interaction with systems; their paper suggests that social contexts are crucial to not only the use, but the design of systems. Their paper is also an exemplar of the methods of enquiry which characterises many of the papers in this issue, and the kinds of data which are the material for those methods: they employ 'naturalistic' examples of interaction, both conversations and actions, between collaborators, which is then scrutinised for regularities of organisation, the sense that the subjects make of their interaction, and the ways in which that growing sense shapes further understandings. These methods may be somewhat unfamiliar, if not alien, to some readers, but this opening paper in the volume serves to

provide an introduction which hopefully gives a sense of the ways in which these methods and assumptions can provide valuable practical understandings of the social contexts of intelligent systems.

Other papers in this special issue approach the social contexts of intelligent systems from a number of different angles. Hugh Robinson in his paper "A philosophy of computing: the case of sociology and computing" discusses what is, and might be, the relationship between sociology and computing, suggesting that sociology can offer a way into studies of computing knowledge that are "beyond the mere technical". Robinson critically appraises the relationship between sociology and computation, suggesting that there remain significant problems ("the practical advice to computer scientists might be to be beware of sociologists bearing gifts, and to sociologists, to take the money and run"), but that sociology can be instrumental in creating a discipline which is 'reflective'.

An example of an attempt to directly influence intelligent system design through the kinds of knowledge and findings generated by the social sciences is apparent in Loren Terveen's paper "Intelligent systems as Cooperative systems". His paper takes as a starting point the influence of sociology on 'traditional' AI, in terms of the injunction issued by sociology that human action and interaction is situated, improvised and bound by and created in a social and interactional context. Terveen describes *collaborative manipulation*, which aims to ground human-computer interaction in the activity of joint use and creation of objects in a shared workspace, which is demonstrated in a knowledge acquisition tool, the HITS knowledge editor. Terveen's paper indicates that valuable practical outcomes can be the result of considering social contexts in design, and that workspace, materials-

based, communication can be employed to significantly augment human performance with systems.

A similar marrying of AI and Human-Computer Interaction (HCI) through the social sciences is exemplified in "Practicalities of Menu Use: improvisation in screen-based activity" by Paul Luff and Christian Heath. Luff and Heath attempt to counter sociologists' arguments that much use of interpretive sociology in design is the result of "fundamental misunderstandings". They do so through a methodology (and associated data capture tools) designed to be sensitive to the details of human-computer interaction. Their detailed examination of menu use in an interactive graphical application through a typology of menu selection, reemphasises the situated, context dependant nature of the interaction between human and system, and "the varied, complex and often improvisational nature of [...] a rather straightforward component of human-computer interaction". Luff and Heath's paper demonstrates how the methods and findings of the social sciences have started to be shaped and moulded to the exigencies of analysis of the social contexts of systems and humans acting in concert. As they note, the tools, and many of the assumptions, of sociology are not immediately appropriate to the range of different social contexts of intelligent systems (medical consultations involving doctors, patients and systems, or screen-based activity in complex control and monitoring situations, for example).

Geoff Cooper in his paper "How do I know that's what I want?: The social construction of ignorance" approaches the social context of intelligent systems from the perspective of the discourse in which computer science, and in particular HCI and AI, exist. Cooper focuses on the term 'user' and examines how, through an ethnomethodological analysis of the interaction between a user of a document processing

system and a colleague, a 'user' and 'users' are socially constructed – rather than stable “cognitive entities” (in terms of the distinction between 'technical knowledge' and 'desired ends', for example). Whilst suggesting that these findings should not be, and would be problematic to be, treated as precise design recommendations, Cooper suggests that a sensitivity to the ways in which 'user' is construed can have significant impacts on the process of specification and design of software systems.

The discourse of computing and AI, and in particular the fundamental question of the demarcation of 'sociality' or 'humanity' to a machine, is also approached in Paul McIlvenny's paper “Constructing Societies and Social Machines: stepping out of the turing test discourse”. McIlvenny examines the traditional discourse which surrounds the “manifold and intriguing enterprise” of the turing test, and suggests that it has hindered the application of the social sciences to AI, particularly since it sets out a set of criteria (individualism, mentalism, closed systems, emphasis on design, *inter alia*) for assessing 'intelligence' in a machine. Rather, employing the assumptions of ethnomethodology, McIlvenny suggests that concepts emergent from sociological study (community, decentralisation, situated activity) can offer new understandings of both social activity and intelligent systems.

The social context of intelligent systems is explicitly assumed to consist of organisational structures and communicative patterns in the paper “Conversations for action: a speech act model of human-computer communication in a psychiatric hospital” by Morelli, Bronzino and Goethe. Their paper describes an application of an analytic framework based on speech act theory to represent the interaction between workers

using information systems in a particular organisation – a psychiatric hospital – in terms of “conversations for action”. The underlying framework assumes that interaction between users of information systems is inherently linguistic, and that a perspective which emphasises the link between language and action can inform the design of systems which support the communicative goals of individuals. Importantly, the information system itself is viewed as a participant or agent in a communicative network, and as such can be modelled to facilitate the conversations for action between its users.

The closing paper in the issue, “Organisations Plans and Schedules: an interdisciplinary perspective on Coordinating AI agents” by Ed Durfee, looks at 'organisation' as a metaphorical construct used by AI. His paper attempts to tie together work in AI and social science through DAI (Distributed Artificial Intelligence). DAI, as Durfee points out, has used 'social metaphors' (those embedded in organisations, for example) to build computationally-oriented theories of coordination. However, to move towards a thoroughly integrated interdisciplinary approach to coordination, which is required as AI agents are integrated into multiagent settings, Durfee suggests that AI must reflect back and modify 'social theories'. In this way the paper represents an approach which integrates issues of interaction and communication which have previously been the province of sociology, into computational theory.

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