



## Talking Work: Language-games, Organisations and Computer Supported Cooperative Work

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**Abstract.** This paper asks the question: how might CSCW system design obtain and be informed by an adequate real-world, real-time understanding of work and organisation on any occasion of work-oriented design? The problem is not a new one but foundational within contemporary research and development communities. Building on established, albeit contentious, sociological reasoning within CSCW, this paper proposes that existing approaches may be complemented through a methodological or procedural attention to the relationship between language, work and the local production of organisation. As such, this paper outlines a practical strategy or approach towards producing real-world understandings of work and organisation within the constraints of design. The approach is derived from work and lessons learnt in conducting ethnographic studies in the course of accomplishing the Dragon Project; an interdisciplinary project involved in the development of a production version prototype of a global customer service system supporting the commercial activities of a large geographically distributed shipping company.

**Key words:** distributed organisations, ethnography, instances, language-game, mapping grammar, problem-solution space for design

*‘To design new artefacts that are useful for people, designers have to understand the language-games of the use activity.’*

Pelle Ehn, Work-Oriented Design of Computer Artefacts, 1988: 108

### 1. Introduction – orienting to work and organisation for purposes of design

As Ehn pointed out over decade ago, effective work-oriented design depends on an adequate understanding of real-world practice. More: it depends on a *means of achieving* an adequate understanding of practice on any occasion of design. The principle issue here, then, pertains to how systems design in general, and CSCW in particular, may ‘go about’ getting ‘hands on’ on practice, or the language-games of use activities as Ehn describes it? Furthermore: how may it do so in a procedural, and thus reproducible, fashion which not only sensitises designers to practice but furnishes concrete resources for design in the process? The problem is a methodological one – one of developing appropriate procedures towards

understanding practice which are responsive to design problems (in contrast to social science interests) – and of relating the understandings produced in some intelligible and useful way to designers. It cannot be stressed enough that I do not assume there to be but one way to understand practice adequately for purposes of design nor that the procedural approach outlined here is intended to stand alone. On the contrary, the ‘language-game’ approach, as I shall call it, is intended to complement and work in ‘parallel’ with other approaches to work-oriented design, particularly cooperative design and object-oriented approaches (Christensen et al., 1998).

Drawing on ethnomethodological insights in particular, the problem of understanding practice *and* informing design is here elaborated (1) through a brief consideration of two fundamental sociological orientations to organisation, and (2) through a consideration of the problem using the Wittgensteinian metaphors of ‘language-game’ and ‘mapping grammar’. Examples from the Dragon Project<sup>1</sup> are employed towards elucidating a practical approach to solving the problem of producing adequate real-world understandings of work and organisation within constraints of cost and time and for express purposes of design. Following Ehn, the approach outlined here trades on a principled orientation to the language of the workplace. Practical implications that attention to workplace language affords systems design in general, and CSCW in particular, are outlined in considering the notion of ‘instances’ of language-game concepts in their natural settings of use.<sup>2</sup>

In adopting an ethnographic attitude, which will not be explicated here as it has been frequently documented elsewhere (e.g. Suchman, 1987; Hughes et al., 1992; Kensing and Simonsen, 1997), I outline one possible way in which an adequate real-world understanding of work and organisation might be produced and utilised in design. The distinctive character of the ethnographic attitude I advocate is elaborated through a brief consideration of two sociological orientations to work and organisation which have been adopted in the design of computer-based systems.<sup>3</sup> This is followed by a more detailed consideration of the problem using the Wittgensteinian metaphors of ‘language-game’ and ‘mapping grammar’ (and by ‘grammar’ I do not refer to a common and shared body of rules of communication however conceived but, like Wittgenstein, to the sense that worlds have in the accomplishment of specific activities and production of distinct forms of life). Here I explicate in detail, and by examples employed in the design of a global customer service system (GCSS), how workplace language may be oriented to and utilised in securing a real-world reference for design.

## **2. Orienting to organisation sociologically**

It is not my intention here to review the history of organisational thinking, such a task is beyond the limits of the present concern. Given the issues at hand however, I intend to briefly review two fundamental orientations to work and organisation taken within the social sciences which have, however explicitly or implicitly and in

whatever guise, been put to work in the design of cooperative systems. Namely the attitude that organisations are objective structures which order activities in contrast to the attitude that organisations are orderly accomplishments produced through the embodied work of an organisational staff.

## 2.1. ORGANISATIONS AS ORDERING STRUCTURES

Orthodox thinking within the social sciences orients to organisations as objective structures within which activities of work take place. In other words, organisation is treated under a logic of exteriority and construed as a container (Coulter, 1982). By a logic of exteriority, I mean that orthodox sociology orients to organisation pre-theoretically as an objective structure 'out there' which 'shapes' conduct or behaviour 'inside' it. This pre-theoretical assumption is imported wholesale at a theoretical level, where the container concept does work in many and varied ways as attested to by the corpus of sociological theory. Despite a vast array of 'competing versions' (Pollner, 1987) one commonality exists and is expressed in terms of the basic concept of order, or, more precisely, orderliness. Simply put, the notion of orderliness refers to the regularity of behaviour 'within' organisations, to recurring patterns of conduct. From the theoretical perspectives of organisations as containers or ordering structures, the regularity of behaviour, or working practice, within any organisation is construed, following pre-theoretical assumptions, as the product of the organisation's objective structure. The structure, conceived of in a variety of ways, orders the work or, more clearly, directs activities in such a way that distinct patterns of conduct are recurrently produced.

In employing the container concept, orthodox sociology orients to, and subsequently treats, organisations as though they consisted of various physical and material arrangements separable from the embodied interactions occurring within them. Accordingly, a multiplicity of organisational structures of varying kinds are said to order activities of work on such an orientation (Morgan, 1997). As Coulter points out:

[This] latter sort of quasi-theoretical generalisation [the container concept] confuses organisation as a vernacular objectification with organisation as an ordering of, or an arrangement to, interactions between persons. As a vernacular objectification, any organisation (from Corporation A to Syndicate Z) may be claimed to "contain" organisations of social activities, but as a technical concept, an organisation is not, and cannot be, the name for any sort of "container" . . . [in that and precisely because] it is the activity which gives the familiar organisation its practical availability.

(Coulter, 1982, p. 43)

In other words, it is fine for members conducting their everyday affairs to construe organisation as a container. For the practical purposes of sociology, and parties wishing to develop a sociological awareness however, a failure to recognise the

distinction between vernacular interests in organisations and technical interests in the interactional ordering of organisations only serves to obscure the very phenomena of interest – organisational activity and its constituent phenomena. Thus, a central methodological problem for parties interested in the social organisation of organisations is to develop means of understanding organisation in details of the observable ordering of interactions between persons embedded ‘within’.

Under the orientation of organisations as ordering structures the ordering of interaction between parties to activities of work has been recurrently (but by no means exclusively) portrayed as the product of structurally prescribed roles, interactional expectations and ultimately, the following of activity specific rules.<sup>4</sup> Sociological focus on rules and rule use has been extensive and although I too want to labour the notion to some extent, I simply note at this point that reports indicate that rule-based systems developed under an orientation to organisations as ordering structures fail to support cooperation in work in an adequate fashion as a result of ‘inflexibility’ in actual situations of use (Jirotko et al., 1992).<sup>5</sup>

## 2.2. ORGANISATIONS AS ORDERLY ACCOMPLISHMENTS

Relatively recent developments within the social sciences suggest that organisations might be seen to be thoroughly embedded in and produced through routine social interaction and thus emerge from the embodied accomplishment of day to day tasks (Garfinkel, 1986). From this position, organisation is oriented to as a ‘thematic unification of mutually elaborative phenomena’ (Sharrock and Watson, 1988). Namely the family of activities constitutive of work and, what for members, is the ostensive structure ‘within’ which those activities are located. Action and structure elaborate one another in other words. The fundamental and ‘elaborative’ characteristic of organisation from this perspective is the ‘working division of labour’. Seen from this point of view, an organisation’s staff perform specific activities in relation to the achievement of work and when those specific activities are accomplished – or not as the case may be – work is passed on to another in order for further action to be taken. Thus, the organisation’s daily business is achieved and so it is *in practical details of doing* the work and *coordinating* individual activities with others that recognisable organisational structures emerge (Anderson et al., 1989).

The practical details of doing and coordinating activities of work consist of discrete ‘instructed actions’ – observable (and thus describable or reportable) embodied organisational practices for accomplishing specific activities (Lynch, 1993) – whereby members produce and concert their activities into the smooth flow of daily business in the face of breakdowns, glitches and other unanticipated contingencies. It is, then, in practiced detail of instructed action that organisations are produced day in day out, and moment by moment, by an organisation’s staff in the course of accomplishing and concerting the activities productive of the daily business of the workplace. And it is details of instructed action that distinctive

'organisational structures' emerge out of staffs' performance, accomplishment and orchestration of activities of work observably manifest as the 'working division of labour'. Consequently, on this orientation, organisation is construed as an emergent product of the instructed actions whereby staff perform and accomplish particular activities and orchestrate the coordination of individual tasks. Organisations are thus characterised as orderly accomplishments or, alternatively, as local productions, in so much as they are produced by a situated staff engaged in accomplishing work's daily business in and as the instructed workings of the division of labour. To be very clear here, 'organisation' is produced, and activities are ordered, in the doing of instructed actions on this account. But what do I mean by the doing of instructed actions and what relevance does the notion have to design?

### 2.3. INSTRUCTED ACTIONS AND THE ORGANISATIONAL ORDERING OF INTERACTION

By invoking the notion of instructed actions I am not invoking some kind of prescription but seeking to draw attention to the embodied, locally accomplished organisational practices productive of particular activities of work. These practices are instructed in the sense that they are (1) tied to the accomplishment of specific activities; (2) what members learn and must learn in order to get the job done and done again in a competent manner; and (3) make the job observable/recognisable to practitioners and outsiders alike. The difference between a prescriptive sense of instructed actions and an embodied, locally accomplished sense of instructed actions, and thus between container and orderly orientations to organisation, may be grasped more concretely in considering formal accounts of customer service work in the container shipping business in light of ethnographic studies of that work.

### 2.4. FORMAL ORGANISATIONAL ACCOUNT

According to the formal organisational description of conduct, freight quotes (the calculation of costs for shipping containers), for example, are formulated in something very much like the following manner:

On receiving a call or fax from a customer enter the local system. Choose the quote option from main menu, press enter and select the customer requirements option – the system displays the requirements capture panel. Insert the customer's account code – if not known, type customer's name and shipping role and select the relevant code from the retrieved list; refer the customer to accounts if no code exists. Account code in-hand, enter the name of the contract person and their phone and fax number. Then enter the receipt code – the shipping code indicating cargo's geographical point of origin. If the code is not known, query by real geographical name and select from the retrieved list. Enter the load port code – ditto. Enter the code for delivery location – ditto. Enter receipt and delivery service or mode of

shipment requested – full container, partial container etc. Enter equipment details – quantity, size and type of containers. Enter commodity description including weight and classify cargo. To classify, select the commodity or item's pricing code from retrieved list. Specify the route – preferred route is inserted automatically on command. Validate the quote – specify period of time quote applies within. Calculate the rate – automatic on command. Calculate any additional surcharges – manually adjust rate and recalculate. Check the expected contribution margin to be generated in shipping the cargo. Reject the quote if the expected contribution is negative or below service line limits (contractual obligations and long term business prospects aside). If the expected contribution is positive, update the quote's status to 'ready', add any remarks if necessary, submit for acceptance (a system based viability check), and issue the quote to the customer.

Whether a rate request is occasioned by phone or fax these are the ways in which work has been described, and in training is prescribed, by work analysts within the organisation itself.

## 2.5. ETHNOGRAPHIC ACCOUNT

The ethnographic account of rate of formulation does not seek to ironise the formal account. Rather, it seeks to explicate that somewhat abstract description in terms of concrete, observable action; in terms of rate formulation's embodied achievement at the worksite. The following account describes a phone based quote. It should be said that whenever possible, staff avoid formulating rates over the phone due to the amount of time system navigation consumes in accomplishing formal business procedure – a consequence of 'hardwiring' rules of conduct.<sup>6</sup> Hand written notes or notes recorded in the remarks section of the customer requirements panel are usually taken and the rate is typically formulated after the call. The degree of details noted down varies in accordance with how well the quote agent and customer 'know each other' – the details and needs of long-standing clients are well known by quote agents and notes are quite often minimal, consisting in just a name and receipt and destination for example. The temporal and contingent nature of work means that hand written notes are routinely placed in a pending tray awaiting time to process them. Despite the time consuming nature of system use, quote agents who are very familiar with the system may on occasion – either in urgent cases or in cases when a new or infrequent client calls – provide a quote over the phone. For example:

Having received a call from a customer warranting the phone based formulation of a rate, the quote agent elicits the necessary cargo and shipping details (from where to where, quantity, size and type of containers, commodity description). These details are inserted into the system as they are elicited along with the customer's name. The specification of appropriate routing is facilitated through the use of hard copy, service specific shipping schedules or 'cheat sheets' to-hand. Codes are usually specified from 'memory' or through the use of lists setotaped

to the computer or desktop and are inserted via 'nicknames' (HEIN or Heineken Brewers, HAM for Hamburg, FLX for Felixstowe etc.).<sup>7</sup> Having established the criteria required to produce a rate, the quote agent checks the expected contribution. The fiscal details of missing or out of date surcharges and discretionary add-ons are identified through the use of cheat sheets or hard copy files to-hand. Expected contribution figure in-hand, the quote agent writes the customer's name, the rate and the expected contribution down on a paper notepad. He or she then quotes the rate to the customer and the call is reciprocally brought to a close. The customer will typically 'consider' the rate where 'consider' means call back some time later saying that a competitor has offered a lower rate. The seasoned customer does not usually disclose this rate but asks the quote agent for a more competitive rate. The quote agent knows this is 'par for the course'; that the customer may or may not have a competitive rate but in light of a failure to disclose 'probably doesn't' is not the point. The point, from the customer's perspective, is to get the price down as low as possible; from the quote agent's perspective, to make as much profit as possible. This scenario is known, taken for granted and reciprocally oriented to in the manner of not paying attention to it but to the potential 'business' the situation presents. The quote agent retrieves the quote by customer's nickname and checks the componential details of the rate, relays selected fiscal details to the customer and if possible, offers a lower rate. The quote agent does not of necessity need to check the rate details again, the rate and profit margins are already known, it is work done for practical effect under the auspices of 'negotiation' and to make visible that providing a lower rate consists in 'work' that is 'done-for-you', that it is 'the-best-that-can-be-done' and that it has been done 'authentically'. It is not demeanour work (COMIC 2.2) but customer service work and the quote agent usually has a good sense as to whether or not the new rate will be accepted by the customer before he or she puts the phone down even though, as often happens on such occasions, it has not been accepted yet. As and when the customer accepts the rate, the quote agent inserts the customer's details into the system, achieving formal procedure, and formally issues the quote. He or she then 'passes' the work 'on' to the booking agent in and through accomplishing specific instructed actions providing for compliance with formal procedure.

## 2.6. INSTRUCTED ACTIONS – THE EMBODIED ORDERING OF INTERACTION

The ethnographic account of quote work is clearly different but not antithetical to the formal account. However, in paying attention to the embodied details of the work, the ethnographic account makes visible the instructed actions in and through which staff comply to formally prescribed rules of conduct. Actions such as specifying routes and identifying add-ons through the use of cheat sheets or negotiating shipping rates with the customer – actions absent from the formal account yet crucial to the competent performance and accomplishment of the work.

The notion of compliance is of paramount importance here, as an organisation's staff do not follow rules in a prescriptive step by step fashion – on the contrary, they avoid formal rules for efficiency's sake insofar as they hinder the irredeemably contingent performance of work (Blau, 1963). Practitioners instead, and as a sanctionable matter of necessity, comply with formal rules and do so in improvised ways which become routine over the course of time in dealing with recurring contingencies such as urgent rate requests or the time consuming nature of system use (Bittner, 1965).<sup>8</sup> Improvised practices of compliance, made routine and modified over the course of time, just are the instructed actions tied to any particular job. They make the job as real-world, real-time activity observable and their observation reveals the craftful (or skilful) nature of work: in providing a quote over the phone staff have developed specific practices of negotiation for example. These organisational practices are not provided for by formal rules of conduct, indeed they are not to be found anywhere in formal accounts of work: they are staffs' natural inventions devised in-keeping-with-the-spirit-of-the-rule and guarantee the successful day in day out accomplishment of work (Zimmerman, 1973). Thus, the orderliness of work is not produced in and through a step by step adherence to prescriptive rules of conduct but rather, through the performance of innovatively devised practical arrangements of instructed actions providing for compliance with formal rules. Instructed actions, or real-world organisational practices, cannot be discovered on a container view of organisations as real-world practice is taken to be nothing more than an index to some underlying 'structural' phenomenon ordering the work and are, as such, superficial (Garfinkel, 1967a). Insofar as the daily accomplishment of work clearly relies on real-world practice however, then as various members of the CSCW community have gone to great lengths to point out, there would appear to be something 'essential' missing from good design practice (Hughes et al., 1991; Schmidt and Bannon, 1992; Bannon and Hughes, 1993). Namely, an attention to the working division of labour, component activities, *and* the embodied organisational practices (instructed actions) in and through which work observably 'gets done' in real-time.<sup>9</sup>

The embodied account of quote work's accomplishment suggests the orientation to organisation as an orderly accomplishment to be a more adequate orientation to work and organisation than that of organisation as ordering structure. In many respects, this is not a question of right and wrong but of practical utility for the purpose at hand: namely designing cooperative systems that resonate with or 'fit', and at the same time transform, the organisational activities within which they are to be embedded in the course of their use. That adequacy consists in an orientation to the instructed actions whereby activities of work 'get done', are coordinated with other activities, and from which distinctive organisational 'structures' emerge in the local accomplishment of activities of work. All well and good, but how are instructed actions to be usefully explicated in a design context?



### 3. Explicating instructed actions and the local production of organisation

Current solutions to the problem of producing an adequate understanding of practice on occasions of design instruct us to pay attention to the routine interaction of staff and the ways in which they produce, utilise and transform information through the practiced uses of artefacts in the course of work's performance (Suchman and Trigg, 1991; Heath and Luff, 1992; Hughes et al., 1992). Without disagreement, indeed in the spirit of further development, I want to pose the question 'what more' do we need to do in order to develop an adequate appreciation of the local production of organisation on any occasion of work-oriented design; 'what more' might 'going about' generating such an understanding consist of; and 'what more' might it consist of in relation to doing design? Specifically 'what more' might it consist of in relation to doing design for large, geographically distributed organisations of work? In an attempting to elaborate a commonly applicable procedural approach capable of dealing with this particular 'problem of scale', below I outline a strategy towards informing design emergent from the Dragon Project informed by the Wittgensteinian metaphors of 'language-game' and 'mapping grammar'. First, however, a few words about the project itself by way of formulating the problem proper.<sup>10</sup>

#### 3.1. THE DEVELOPMENT CONTEXT

The Dragon Project was an interdisciplinary endeavour involving practitioners from object-oriented design, participatory design and ethnography. The project was concerned with developing a production version prototype for a global customer service system supporting the commercial activities of a large geographically distributed shipping company. Staff work out of some two hundred and fifty offices located in seventy countries on six continents providing world-wide coverage. No global system or practice existed at the time when the project was initiated (March '97).<sup>11</sup> In light of challenging short to medium term economic forecasts and a review of regional business processes, the company elected to develop a cooperative system supporting the global implementation of 'improved' business processes (BPI). The aim of the BPI was to streamline work processes, providing for the accomplishment of work in a shorter time frame and with fewer resources. GCSS was not part of the BPI itself but rather, intended to provide support for BPI objectives and procedures. The prototype was founded on the notion of 'flexibility' – it may support BPI objectives and procedures and then again, it may also support alternate objectives and procedures as the company develops in the future. Development activities were coordinated with BPI objectives through periodical reviews. From the organisation's perspective the prototype was developed 'iteratively' under RAD conditions within a time frame (from initial development to implementation) of two years.<sup>12</sup> From an ethnographic point of view, indeed from everybody's point of view, the first and biggest problem the project presented was its sheer scale: a globally distributed company with over two hundred and

fifty offices in seventy countries world-wide. Thus, the very practical problem that presented itself revolved around the issue of how we might ‘go about’ getting an adequate informative handle on practice in general, and across widely distributed sites in particular?

### 3.2. UNDERSTANDING WORK IN WIDELY DISTRIBUTED ORGANISATIONS – LANGUAGE-GAMES

A fundamental feature of human practice is language and, as different practices are marked or made observable by different ways of talking (consider military, medical, legal, and domestic talk, for example), different practices might be said to employ distinct ‘grammars’. Wittgenstein describes distinct ‘grammars’ as ‘language-games’, a notion which

... is meant to bring into prominence the fact that the *speaking* of a language is part of an activity, or form of life

(Philosophical Investigations: 23)

The speaking of a language is part of a form of life. If this is so, and as the late Harvey Sacks (1992) recognised, attention to the orderly features of language ought to render particular forms of life observable. Which orderly features are of use here? Consider the following example:

Let us imagine a language ... meant to serve for communication between a builder *A* and assistant *B*. *A* is building with building-stones: these are blocks, pillars, slabs and beams. *B* has to pass the stones, and that in the order in which *A* needs them. For this purpose they use a language consisting of the words “block”, “pillar”, “slab”, “beam”. *A* calls them out; – *B* brings the stone which he has learnt to bring at such-and-such a call. – Conceive this as a complete primitive language-game.

(Philosophical Investigations: 2)

There is a great deal that could and has been said about this primitive language-game and the form of life the grammar of that game elaborates (Malcolm, 1995). What I want to draw attention to here is that the form of life described above – the imaginary job of work (building) – is ordered (1) through the concepts constituting the grammar of the language-game (blocks, pillars, slabs and beams), and (2) through the practiced application of those concepts in accomplishing the activities to hand (bringing a slab, not a beam, when slab is called out, etc.). Thus, and to make a general point on the basis of this example, the language-game in a through which any particular form of life is produced consists, in the first instance, of *a grammatical web of interlocking concepts and discrete activities to which their application is tied in and through instructed actions* or real-world working practice (Hacker, 1996).

To be clear her, the concepts of a language-game (the grammatical web) gain their sense from the activities to which they are tied, and more specifically, from the

instructed actions in and through which they are tied (Wittgenstein: PI 6). There is, then, a distinct *situated* sense to particular concepts – to the concept of ‘quoting’ (for example) in *this* form of life (whatever it may be). A situated sense that is different to the one the same concept has in another form of life. There may, of course, be similarities between the two, something of a ‘family resemblance’ (PI 66). However, differences are important as the situated sense of any particular concept is irredeemably tied to the particular activities and actions in and through which the particular aspect of the form of life the concept describes is produced. The important point to appreciate here, then, is that there is a concrete relationship between the concepts employed ‘within’ in an organisation to describe the organisation’s daily work *and* the accomplishment of that work. Thus, there is a direct relationship between the concepts employed ‘within’ an organisation to describe its daily work and the production of that organisation as a distinct form of life (as container shipping company rather than an insurance house, for example).<sup>13</sup>

So what does the notion of a ‘language-game’ have to do with the effort to produce real-world understandings of work and organisation? Well, does the working division of labour not describe an organisation’s daily work? Does it not consist of a grammatical web of concepts tied to specific activities in and through instructed actions? Furthermore, insofar as widely distributed organisations deal with the *same* work only in different physical places, does the grammatical web at work not elucidate practice across geographical boundaries? And does it not follow that regional variations in the grammatical make-up of the web elucidate *differences* in working practice in different places, thus elucidating regional (and may be even local) variations and contingencies? Insofar as these things do follow then we are not obliged, in the first instance, to conduct a wide range of empirical studies in undertaking studies of work for design. Rather, we can ask practitioners who are intimately acquainted with the organisation of work to elaborate the working division of labour in different regions. This is a first point of procedure and it provides a concrete focus for conducting ethnographic work in distributed organisations.

In the context of customer service work in container shipping the procedure elucidates the following. That customer service work consists of the activities of ‘quoting’ and ‘pricing’ (formulating, respectively, standard and non-standard financial rates for containers); ‘export handling’ (arranging for the use of specific containers and planning specific haulage routes and shipment routes on specific vessels); ‘allocation’ and ‘rerouting’ (assigning and re-assigning containers to specific vessels); ‘documentation’ (drawing up legal papers covering ownership and shipment); ‘import handling’ (making import and cargo release arrangements). These concepts apply globally, they elucidate what customer service work in container shipping is ‘all about’. Differences occur not in this fundamental organisation of work but in the regional, and local, achievement of work. Documentation is accomplished differently in Asia than Europe, for example, and under different local circumstances in Hong Kong than Singapore. Similarities and differences such as these were obtained through talking to practitioners and conducting

'quick and dirty' studies (Hughes et al., 1994) in the three distinct organisational regions of work (Asia, Europe and the US). To develop a more detailed understanding of the embodied character of similarities and differences, however, requires that we accomplish procedure two: mapping the grammar of the language-game. This procedure requires that we go out and look at practice and, through description of the instructed actions observed there, make the web of activities tied to language-game concepts visible (thus coming to understand regional and local similarities and differences in the organisational fabric of the grammatical web).

It might be remarked; 'Why not just say you are describing activities? Why invoke the notion of mapping grammar here?' Without wishing to argue over descriptors, the point of invoking the notion is to emphasise the relevance to design of making observable the grammatical web of activities and instructed actions productive of the form of life in question, as it is just this grammatical web of activities and instructed actions that the system will be embedded in and transform. The notion of 'grammatical web' reminds us that activities 'hang together' – are reliant upon one another in practiced ways which, from an investigator's (or designer's) point of view, have yet to be appreciated. That activities are interconnected in the first place ought to demand our attention as the organisational reasons for their interconnection may be crucial to good design (Randall et al., 1995). That a vessel's freight manifest is 'checked' prior to departure *and* on arrival in the context of container shipping, for example, may (and indeed under the auspices of company's BPI programme did) seem to duplicate work. Closer inspection of the activities tells a different story however. In 'checking' the manifest on departure, customer service staff are making sure that freight is legally covered for shipment. Whereas in 'checking' the manifest on arrival, customer service staff are, among other things, making sure that all importation documents are in order – documents that are often required elsewhere during shipment (e.g. transit ports) and are thus unavailable to the company prior to import at the destination point. There is no duplicity then, the term 'checking the manifest' glosses two very different but interconnected activities and a failure to appreciate that difference can only have detrimental effects on the design of a system supporting customer service work. *A fortiori*, producing an adequate understanding of the grammatical web, and thus of the practiced interconnection and relation of activities, within the constraints of design would seem to be important.

### 3.3. MAPPING THE GRAMMAR OF THE LANGUAGE-GAME

Whether through discussion with practitioners or 'quick and dirty' studies of embodied practice (or both), and having identified what might be called the 'primary' concepts of the language-game – quoting, pricing, export handling, etc. – and the sense in which they relate to one another in practice, the next step is to map the grammar of each primary concept. Each primary concept consists of a 'family'

of relational concepts. The primary concept of ‘building’ described in language-game (2) above, for example, consists of the relational concepts “blocks”, “pillars”, “slabs” and “beams”, each of which is tied in practiced ways to particular activities. Mapping the grammar of the language game consists of identifying each primary concept and its relational concepts, and of mapping their individual grammatical features then. For example<sup>14</sup>

**Example 1.0** Export handling consists of making a booking which requires the making of a preliminary booking, specifying freight type [full load, partial load, over size load, dangerous cargo; each of which is associated to other relational concepts, over size to dimensions, for example, or full load to container size and type], routing the freight, choosing appropriate vessels, checking space allocation, confirming pricing and planning arrangements, arranging inland haulage if necessary, confirming the booking, and notifying the customer of bookings accomplishment.

By ‘mapping’ individual grammatical features I mean this: describe in local, indigenous, observably happening detail, the instructed actions in and through which each relational concept assumes its situated sense. In describing the instructed actions in and through which the concepts at work assume their sense, the procedure makes available to consideration in design ‘just how’ the activities described by those concepts are accomplished in real-time (again, the following example is but a gloss on practice intended to convey a sense of procedure):

**Example 1.1** In mapping the concept of booking over size freight we must, in addition to regular booking concepts (see Example 1.0), map the concepts of dimension (which consists in obtaining and inserting details of length, width, height and weight into the system), equipment management (the availability of appropriate equipment must be confirmed; often verbally over the phone or alternatively via telex), and approval for the freight to go on board. The shipment of over size freight must be approved by the vessel coordinator or capacity manager; work which consists in sending an internal telex marked OOG to the coordinator who, after accomplishing his or her work (which may entail negotiating the allocation of space with line management), approves the booking by inserting A for accept and returns the telex. Over size freight bookings cannot be confirmed and thus shipped without approval.

Despite its simplicity the above example serves to point out that mapping a relational concept’s grammatical features not only makes the practiced details of the particular activity’s accomplishment observable but also, and at the same time, renders apparent the embodied ways in which that accomplishment relates to, or is coordinated with, other activities in the working division of labour. Furthermore: in providing such an account we come to understand the organisational practices whereby particular activities of work, booking OOG say, are produced across distributed sites within the *same* organisational region of work.

There is, then, a ‘representative’ sense to grammar – we do not need to go to every single site to understand working practice – although a great many people may be sceptical about this claim. Nonetheless, in so much as activities of work are, without question, organised and understood from ‘within’ the working division of labour in terms of primary and relational language-game concepts then such scepticism is not as well founded as it might at first appear. That an organisation’s staff render their own and others activities intelligible in terms of the language-game ought to give the sceptic pause for thought. Take a person *doing* the following activities: *making* a preliminary booking, *specifying* freight type, dimensions, and routing details, *checking* space allocation, pricing, and planning, *arranging* inland haulage, *confirming* acceptance first with the coordinator and then the system, and *notifying* acceptance of the booking to the customer. This person is doing a booking for over size freight. It doesn’t matter who is doing these things as it is through the accomplishment of these activities that a booking for over size freight is done by any *competent* practitioner. Their competency resides in the fact that they ‘go on’ in the *same* ways thus providing for the accomplishment of a booking for over size freight as a matter of routine. These activities, and the instructed actions for their accomplishment, are known in common by competent practitioners, and engaged in by anyone and everyone in doing a booking for over size freight time and time again. Anybody doing something else is not doing a booking for over size freight (although they may be trying to), recognisably so in staffs’ eyes.

The notion of ‘going on’ in common, mutually understood ways is of paramount importance here, for it is because staff go on in known in common ways that they can say of themselves, and others say of them, that they are doing *X* and not *Y* activity. Furthermore: in so much as activities are recognisably just *this* or *that* particular activity for members, then the instructed actions which provide for that recognition are both unique and finite – ‘going on’ in the through performing *these* instructed actions is, recognisably, to do this specifiable activity (booking over size freight say), going on in and through performing *those* instructed actions is to do that specifiable activity (booking a full container or, alternatively, quoting for a partial container say). Thus, the instructed actions productive of any particular activity are not only shared and constitutive – essentially tied to specific activities – but also characteristic, defining and thereby limited.

The finite or unique ensemble of instructed actions in and through which an activity is accomplished I characterise as the ‘occasioned corpus’ (Zimmerman and Pollner, 1973). The occasioned corpus assembles the ‘family’ of organisational practices in and through the performance of which *this* or *that* distinct activity is accomplished, coordinated with other activities, and some aspect of organisation produced and produced locally. Thus, the occasioned corpus assembles the family of organisational practices whereby organisational activities are ordered, and ordered as ‘routine’ activities ‘within’ the working division of labour in contrast to some abstract ‘container’. The occasioned corpus is assembled through mapping a primary concept’s relational concepts and may be put together either

for a particular relational concept or, through mapping the family of relational concepts, for a particular primary concept:<sup>15</sup>

**Example 1.4** Occasioned corpus for the primary concept export handling; relational concepts – financial quote, preliminary booking, freight type [including container size and type], routing, space allocation, equipment management, capacity management, line management, pricing, planning, inland haulage, confirmation, notification.

Primary and relational concepts are mapped and the occasioned corpus thereby assembled through the accomplishment of procedure three: the provision of ‘instances’. Instances are concrete cases of activities-being-done, of work-in-progress (Blomberg et al., 1994). They describe the embodied interactional ordering of language-game concepts; describe the organisational practices in and through the performance of which particular activities are accomplished and coordinated with other activities (and thus describe the real-world actions in and through which the substance of information processes is produced and transformed (Madsen, 1996; Christensen et al., 1998)). Furthermore, taken together instances describe the grammatical web productive of distinct regional organisations of work.<sup>16</sup> Instances are produced through real-world descriptions of language-game concepts being enacted by practitioners (Crabtree et al., 1997). Instances may be provided in the form of video or audio recordings of work-in-progress, supported by transcripts of ‘shoptalk’ interviews with staff ‘going over’ observed activities. They incorporate copies of artefacts-in-use (screen dumps, documents, hard copy files etc.) and in such detail, instances describe the activities, instructed actions and working artefacts in and through which work is accomplished at the ‘coalface’ in real-time.

#### **4. Language-games, instances and implications for computer supported cooperative work**

Instances are employed as a means of relating real-world working practice to system developers; of relating situationally relevant aspects of the grammatical web in details of embodied organisational practice. In such detail they serve to inform design through real-world communicative-analytic practices of ‘trading stories’ in the formulation (or specification) of requirements (Orr, 1996; Crabtree et al., to appear; Crabtree and Mogensen, in preparation).<sup>17</sup>

##### **4.1. AN INSTANCE OF REROUTING**

Rerouting is occasioned for various reasons: bad weather, customer requirements, running off schedule etc. Rerouting consists in ‘reallocating’ cargo to a substitute vessel or vessels (there may be several ‘legs’ and thus different vessels on any particular container’s journey). The substitute vessel may be located in a different

port to the load or leg port. Furthermore, the destination port of rerouted cargo from a particular vessel may well be different. Thus, the activity of rerouting is all about arranging appropriate transport for cargo going to multiple destinations from some contingent point either to the destinations direct or, failing that, to a point from which cargo can be delivered to its respective destination ports. Instances of rerouting's accomplishment revealed that route alterations occasioned not only changing the first leg of a journey but also the first half of the second leg for instance, or, indeed several legs on a journey. Furthermore, these changes were discovered to be subject to criteria of rerouting, specifically of time and cost: an independent local transporter was specified wherever possible if time allowed, rail failing local transporter, truck failing rail; the local transporter is more cost effective than rail, rail more cost effective than truck although time pressures might necessitate everything being moved by truck. It also transpired that rerouted cargo must be grouped: in some locations reefer containers, used for perishable products in particular, cannot be moved to transshipment points by rail for example (due to concerns of supervision – the temperature of reefer containers must be monitored at regular intervals), cargo for this or that destination must be identified and the criteria applied. More: as a result of hard wiring processes in existing technology, rerouting had to be accomplished individually – groups could not be selected and assigned to alternate vessels except in the simplest of cases: 'roll over' or temporal rescheduling to another vessel from the load port. Rerouting is a collaborative activity involving booking agents, capacity management, operations and documentation.

#### 4.2. ANALYSING THE INSTANCE

Achieving an understanding of real-world working practice allow us to identify practical problems of work (rerouting in this case) and embodied organisational practices of solution which taken together suggest possibilities for support through design. In other words, in grasping 'what is really going on' in the course of rerouting, 'what is really the problem' of rerouting and thus what rerouting is 'really all about' becomes apparent (Hughes et al., 1992). Thus, the instance delineates a problem-space emergent from real-world organisational practice itself. Furthermore, in illuminating the instructed actions in and through which staff routinely 'go about' solving practical problems of work, instances delineate solution-spaces rich in productional detail providing for the initial formulation of concrete design-solutions. The emergent understanding of practice produced by the ethnographer and designers in analysing the rerouting instance for example, led to the development of a flexible 'tree structure' supporting staffs' local decision-making by actively displaying all destinations for cargo on a delayed vessel and through the application of which one can specify any number of leg changes and different modes of transport for any group of selected containers, updating all members of the specified group in one go. Instances are invaluable resources in grounding



design in practice and its constituent details, allowing (as the rerouting example hopefully demonstrates) system design to get ‘hands on’ the language-games of use activities and do so in a procedural fashion which not only sensitises designers to practice but furnishes concrete resources for design in the process. As Christensen et al. (1998, p. 25) describe matters here:

The example states problems and solutions from current practice in respect to a specific design problem (designing for the rerouting and rescheduling of multiple bookings). Whenever we encountered problems in the implementation, the instance worked as a common resource: whatever the specific design ideas and problems were, the quality criteria was always whether we could support the instance, not, for example, whether we fulfilled some predefined requirements.

### **5. Getting the message: language-games, organisations and computer supported cooperative work**

Explanations come to an end somewhere and from both a Wittgensteinian and ethnomethodological perspective that is with an explication of what people do and the practiced ways in which they organise their activities. In attempting to outline a distinct set of procedures towards producing real-world understanding of work and organisation for purposes of system design, it has here been suggested that activities of work are accomplished and ordered, and organisation thereby produced, through staffs’ innovative, practical arrangements of compliance with organisational rules of conduct. Those practical arrangements consist of instructed actions – embodied (rather than abstract) organisational practices – for the accomplishment and coordination of specific activities and in their entirety, taken together, constitute the working division of labour (and thus, the organisation as an objective structure or form of life). The suggestion here is that effective CSCW design depends on an appreciation of the instructed actions in and through which practical arrangements of compliance are constituted and the working division of labour produced, in so far as it is just such arrangements that said systems (indeed any work-oriented system) will be embedded in and transform.

The working division of labour delineates what has been described as a grammatical web of interlocking concepts and activities tied together in and through instructed actions. Procedures towards generating an adequate real-world understanding of work and organisation were thus outlined as

- One, treating work and organisation as distinct language-game – as a grammatical web of interlocking concepts (as delineated by the working division of labour) and activities tied together through discrete families of instructed actions.

- Two, mapping the grammar of the language-game – describing the instructed actions in and through which conceptually delineated activities are accomplished and connected (or coordination).
- Three, informing design through the provision of instances of language-game concepts describing the instructed actions in and through specific conceptually delineated activities ‘get done’ (thus relating practical problems of work and instructed actions for their solution to designers).

Instances of language-game concepts delineate a problem-space for design emergent from practice itself. Furthermore: in illuminating the ways in which staff routinely go about solving a particular problem through mapping the relevant concept’s grammar, the instance delineates a solution-space rich in productional detail providing for the initial formulation of concrete design solutions. Thus, instances circumscribe a problem-solution space for design, grounding design in real-world practice (in contrast to idealisations, rationalisations or simulations of real-world practice) and in constituent detail, thereby allowing designers, *pace* Ehn (1988), to get ‘hands on’ the language-games of use activities in a reproducible fashion and in a way responsive to the very practical needs of design. The practicality of the matter might be said to lie not simply in the approach’s real-world purchase but also in its ‘parallel’ relationship to design. Beyond supporting scoping activities, the approach may be readily adopted as and when particular design issues and problems emerge, and in ‘fleshing out’ design issues emerging in the course of prototyping activities (see Christensen et al., 1998; Crabtree and Mogensen, in preparation).

Primary language-game concepts may be mapped by attending to the working division of labour and the membership categories employed by persons embedded there-in. Relational and local language-game concepts may be mapped by attending to the categories members’ use to make their activities intelligible, both to each other and the inquirer, in the course of accomplishing their activities under the auspices of instructed action.

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### Notes

1. Centre for Object Technology – <http://www.cit.dk/COT/>
2. By ‘natural settings’ I draw attention to the sense language-game concepts assume in the accomplishment of *workplace activities* – in contrast, for example, to the sense language-game concepts assume in the production of *design models*. The two are not the same.

3. By 'orientations' I mean practical attitudes towards rather than theories or models of work and organisation. The former presupposes the latter.
4. A popular contemporary version of this orientation to work and organisation is provided in the form of Giddens' 'structuration' theory.
5. Suchman (1983) makes a similar point regarding technological 'models' of work in system design. See also (Section 2.5) herein for some good organisational reasons for the 'inadequacy' of such systems, reasons that complement Suchman's insights and in many senses constitute the case against traditional systems methodology in CSCW systems design.
6. By 'hardwiring' I mean that all the procedures for action are laid out in advance by the machine in a step by step fashion which cannot be circumvented – the machine not only dictates what to do now and what to do next but that the operator must do *this* action now and *that* action next in order to perform some situationally relevant activity. Much of what the machine demands the operator to do is essential for the integrity of the system as a formal system of work but it is entirely irrelevant to the operator's daily task of 'drumming up' work. There is simply no way out of this constraining and time-consuming situation if the operator is to use the machine however. Hence operators avoid systems use when working up business with customers wherever possible. Thus, whenever possible, the machine is used after 'drumming up' business to formally account for particular aspects of the day's work.
7. Cargo is occasionally difficult to classify and quote agents typically collaborate with one another in formulating cargo descriptors that the system will accept thus furnishing an item or price code.
8. In other words, members must, as a matter of course, comply with organisational rules in doing the work lest they be subject to reprimand, caution, tribunal, or worse. While there is a 'necessary' character to formal rules then, it is not a prescriptive necessity (let alone a causal one) but one of conducting organisational affairs in a manner whereby the rules can be said to have been adequately applied in the face of the unavoidable contingencies of the particular 'case' to hand. Insofar as contingencies are recurrent, and the manner whereby they are dealt with suffice, then the improvised ways of adequately applying the rules become routine and standard practice for persons who do the work. Curiously, the organisational adequacy of improvised practices might be said to consist in their not being noticed, remarked upon, etc., by management in that, and precisely because, they suffice to 'get the job done' without undue problem or recourse for concern.
9. Attention to these 'essential' (but by no means immutable) features of work and organisation influenced our own design endeavour in significant ways. Design features include for example: 'hardwiring' and displaying the current state of progress in the overall work process for any particular job, rather than formal rules, so that practitioners can generate situationally relevant 'information' quickly and see at-a-glance where they are now and what needs to be done next when they, not the system, deem it right to do so (also, rules might and indeed do change – then what of the system?); supporting both easy navigation and the coordination of work activities via a single screen organised in terms of working division of labour tabs and activity specific sub-tabs; providing group and personal pending lists allowing for a general awareness of work to be done, and an overview and quick retrieval of work items; providing tailorable on-line shipping schedules. Thus, we seek to support the artful ways in which members comply with formal rules and thereby achieve the organisation's daily business. See Appendix Figure 1 for a more concrete sense of the design issues here.
10. It is not the purpose here to describe the Dragon Project or to explicate empirical mechanisms of coordination. For a discussion of such and related matters see Christensen et al. (1998). The purpose here is solely to elaborate one particular procedural approach towards explicating mechanisms of coordination / cooperation on any particular occasion of work-oriented design, in settings of any scale.
11. By April '99 substantive features of the production prototype were being implemented in global practice.

12. From the development team's perspective the prototype was developed 'incrementally' in an 'evolutionary' fashion and, phase one apart (months 1–4), under normative conditions (Hughes et al., 1994; Knudsen et al., 1994; Mogensen, 1994).
13. Wittgensteinian philosophers may say that the account of language-games offered here is not the same as Wittgenstein's. Whether it is or it isn't is not the point – we are not doing philosophy here but attempting to outline procedures for system design. Towards such tasks, as Wittgenstein was well aware, philosophy has nothing to say. So, *pace* Garfinkel (unpub. manu. a), and in accordance with ethnomethodology's treatment of Husserl (Garfinkel, unpub. manu. b), call this account 'a creative mis-reading' of Wittgenstein's philosophy in an attempt to bring about a way of 'seeing connexions' (PI 122) of a fruitful kind for the purpose to hand.
14. It might be noted that the examples provided below, while derived from ethnographic studies of customer service work, are not offered as ethnographic descriptions but are intended to elucidate the procedural notion of 'mapping grammar'. If read as ethnographic descriptions they will only be found wanting and that is to miss the point here.
15. System design, *pace* Shapiro (1994), is undoubtedly a 'satisficing' activity in which designers do the best they can within the constraints of budget and time, not to mention competing political agendas. Thus the degree to which the occasioned corpus may be assembled is always a practical and *contingent* matter. Nevertheless, the notion provides a benchmark as it clearly demarcates where ethnographic enquiry may be brought to a close. Explanations, as it were, come to end in explicating the embodied organisational practices in and through which the language-game's constituent activities are conducted, and connect to one another so as to form the grammatical web. Insofar as explanations come to end in explicating the embodied 'playing of the game' then so too does the ethnomethodological task for in making visible 'just how' (through 'just what' instructed actions) the game is played in real-time, the orderliness of the phenomenon is accounted for in locally produced detail (Garfinkel, 1967b).
16. In mapping the grammar of the language-game in different organisational regions of work, similarities and differences in practice become apparent. Specific local arrangements of work are (naturally) less easy to detect and in our own project, largely came to light in the course of conducting prototyping activities (Mogensen, 1994) with a wide range of practitioners in a variety of regional settings. A notable consequence of local requirements (primarily, external conditions of work, such as common local business practice or legal demands) was the highly customisable character of the system. Although the interface layout was not subject to change, the process buttons (see appendix) for example, which were integral to the new system (allowing staff to see where they were at now and what needed to be done next on any particular job of work at-a-glance), were tailorable to local conditions of work (such as the peculiar need to confirm that containers had been 'gated in' to port prior to confirming a booking in Hong Kong, for example).
17. Requirements formulation, like any activity of work, 'gets done' in and through talk and is similarly organised through specific activities and instructed actions for its accomplishment. Just as such features are 'missing' from formal accounts of work, then so too they are missing from formal accounts of design practice. Nevertheless, design relies on the 'lived' work of story-telling. In the reciprocal trading and analysing of stories (of work practice and design visions, for example) requirements formulation gets done.

## Appendix

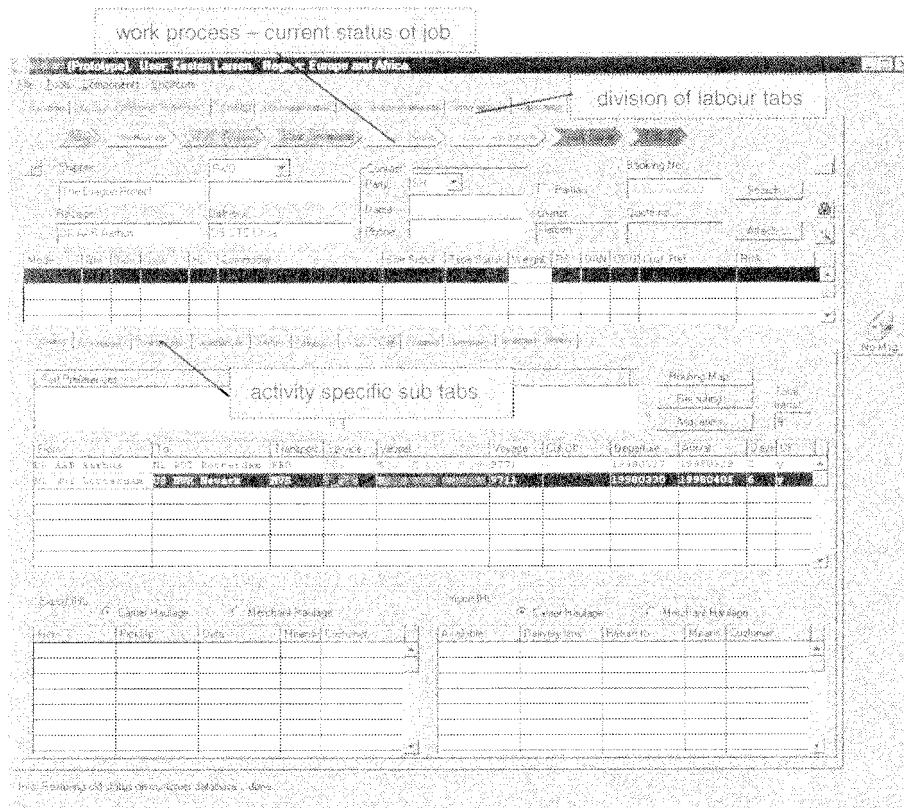


Figure 1. An overview of the main principles in the user interface of the prototype (image blurred for confidentiality).

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