

## C. (THEORY TRACK): FOUNDATIONAL ISSUES OF CSCL

# Making Sense of Shared Knowledge

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### ABSTRACT

In this paper we explore issues to do with *intersubjectivity* and *shared knowledge* in human activity. We discuss these issues by contrasting two different views of language and communication, one being a model developed by Clark and Brennan, the other being a situated action approach. Clark and Brennan's model has gained substantial popularity in CSCL research. We develop our argument by presenting illustrative analyses of two data extracts concerned with the development of shared knowledge, the negotiation of goals and the conditional relevance of technological tools. We conclude that Clark and Brennan's model retains a communication-as-transfer view of language and communication, and that a situated action approach is more suitable for grasping the complex dynamics of joint activity.

### Keywords

Shared Knowledge, Intersubjectivity, Computer-Supported Collaborative Learning, Language and Communication, Situated Action.

### INTRODUCTION

An important issue in sociocultural approaches to human action and learning, such as situated action, situated cognition, situated learning and activity theory, and one lately emerging also in the Computer-Supported Collaborative Learning community, concerns how *shared knowledge* is developed and sustained in human activity (Baker et al, 1999, Dillenbourg, 1999). The possibility of developing abstract theoretical models of the communicative processes involved, as a guide for technological systems design, has also been keenly discussed in the CSCL and CSCW (Computer Supported Cooperative Work) communities (Nardi, 1996, Dourish & Button, 1998, Arias et al., 2000). The emphasis on shared knowledge, goals and concepts is also concurrent with the growing concern regarding how culture and context mediate cognitive activity (Cole, 1996). Shared conceptions of artefacts and tasks, and of the joint activity itself, are obviously important in collaborative activities. Any theoretical disagreement is concerned rather with how we, as analysts, should describe the attainment of shared knowledge and the processes that sustain it. According to Matusov (1996) the research on the role of intersubjectivity in joint activity is still characterized by a view of shared knowledge as overlapping subjectivities. According to him this leads to an overemphasis on agreement in joint activity, and a disregard of disagreement as well as more rhetorical features of talk.

In this paper we want to discuss the issue of shared knowledge, or *pragmatic intersubjectivity* (Edwards, 1997), which is the term we prefer to employ. The reason for choosing this term is that we want to emphasize the procedural and action oriented features of 'shared knowledge': what people treat as shared, how this is accomplished in discourse, and in what ways it is tied to local practices and activities.

To examine this topic we choose a *situated action* approach (Edwards and Potter, 1992, Edwards, 1997, Suchman, 1987) as our analytical point of departure<sup>2</sup>. This entails that topics such as problem solving, reasoning, educational goals and the role of artefacts are approached as sociocultural phenomena constituted in the experienced, lived-in world of different social actors. These topics are part and parcel of pragmatic intersubjectivity. In alignment with this approach, we will try to

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<sup>2</sup> A clarification of the term situated action is perhaps in order. Situated action is not a theory in the traditional sense of the word. It would be more appropriate to describe it as a loosely defined research program with certain analytical commitments. Much situated action research, and especially discursive psychology, has been heavily influenced by ethnomethodology and conversation analysis. Another distinct feature is the emphasis on the situated production of meaning as well as on the constructive nature of language use.

demonstrate how the development of shared knowledge is due to active work by participants in joint activity. Popular dichotomies such as distributed and co-located communication, or online and offline communication are thus subsumed under this more general issue, that is to say, it is reformulated as an issue that has to do with the resources available to people in different social practices. We develop our arguments by contrasting this approach with Clark and Brennan's (1991) model of communication. The final section is devoted to a discussion of the issues that were originally defined, where they are considered in relation to important topics concerned with how goals are negotiated in the course of interaction, and with how technological tools are incorporated and made relevant in joint activity.

## THEORETICAL APPROACH

Intersubjectivity is not a new topic in the social and behavioral sciences. Theories of learning and communication are in one way or another expected to account for the fact that people are able to understand each other and solve problems jointly. To put it crudely one could say that the theoretical accounts differ according to whether they emphasize shared knowledge as founded on structural features of the mind, or on features of an objective reality. Philosophically, these positions are generally labelled rationalism and empiricism respectively. Common features, however, are a conception of language as a paradigmatic and syntagmatic system of signs and referents and of communication as transfer of meaning, or to put it differently, of language as a container of meaning and of communication as transfer of information bits

In recent cognitive models of the mind, knowledge is often conceived in terms of cognitive scripts and schemata.<sup>7</sup> The objective is to develop general models of how meaning is organised, processed and communicated. Scripts and schemata act as selection mechanisms that specify how certain elements of knowledge relate to one another, and these scripts or specific parts of them are invoked in context. Nevertheless, a problem with these approaches is that language-in-use is still conceived as epiphenomenal and idiosyncratic realizations of basic structural properties of thinking and communication, and the impact of diverse factors in pragmatic contexts is accounted for by putting them under experimental control in order to describe their effects.

A situated action approach contrasts with the previous account in at least two important respects. First, it is maintained that the development of shared knowledge is a practical accomplishment by social actors using different kinds of tools that were developed through complex interrelations between culture, individuals and collectives. In this sense, knowledge is reconstructed through human practice, and the issue at stake, for analysts, is to describe how this is accomplished in different kinds of activities and contexts. Second, the emphasis on action enables us to transcend the mind – matter dualism that characterizes empiricism and rationalism.

We will pursue this line of thinking further, by outlining an analytical perspective on intersubjectivity, where the unit of analysis is discursive actions in context. To provide a test bed for our approach we will compare this view to Clark and Brennan's (1991) model of language use. They stress the importance of shared knowledge as well as *grounding*, which is the designated term for the achievement and development of this *common ground*. Common ground is a prerequisite for the development and sustainability of meaningful communication. Attempts to fuse this model with cultural-historical activity theory (CHAT) have recently been made by Baker et al. (1999). They describe how grounding and common ground are prerequisites for the long-term appropriation of cultural tools and signs. An obvious rationale for fusing a theory of learning with a theory of language use is to provide analytical tools for making more detailed descriptions of how collaborative learning actually in takes place in practical situations. According to Baker et al.: "Language sciences provide fine-grained cognitive models of the grounding process, collaboration, and how the two relate, within the short timescale of verbal interactions" (1999:32).

Our analytical departure is as already mentioned a situated view of action (Atkinson & Heritage, 1984, Garfinkel, 1967, Heritage, 1984, Suchman, 1987). To be more specific we utilise analytical insights and commitments developed within the approach termed discursive psychology (Edwards and Potter, 1992, Edwards, 1997), where the interactive and constructive nature of communication is emphasized. Regarding the foundations of shared knowledge, this approach differs from Clark and Brennan's. The analytical starting point is social practice, and cognition is conceived as inextricably linked to observable and accountable actions. According to Edwards and Potter, the construction of meaning through language is an inter-active accomplishment by participants in communication. Meaning is tied to a specific context and dependent on the sequential order of interaction. This does not imply that individuals are the sole self-determining creators of meaning, on

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<sup>3</sup> According to Cole (1996:124-128) *schema theory and script theory*, such as neopiagetian approaches and Schank and Abelson's theory, introduce the domain specificity of reasoning and thinking. In this sense these theories imply a step forward from a view that understands thinking to be a general faculty of the mind. Cole argues that this perspective introduces the context specificity of thinking. However, context is nevertheless understood as external to thinking. This contrasts with the more dialogical and dynamic view of thinking and communication that we are putting forward in this paper.

the contrary, they are very much accountable for their actions, even though they might have different agendas and master different resources.

### **Communication and social interaction**

According to the sociological theory of ethnomethodology, an important characteristic of human action is a fundamental reliance on procedures of contextual determination (e.g. Heritage, 1984, Garfinkel, 1967). However, people are not “cultural dopes” whose actions are constrained by structures beyond their control. On the contrary, people mindfully try to make sense of situations by taking advantage of available resources, and if this understanding breaks down in some way or another, they try to repair it in various ways. This does not imply that actions are idiosyncratic, rather, human interaction is an ordered and structured phenomenon. However, the structures of this interaction have a complex relation to situated human action, that is to say, social structure is produced in and through people’s actions.

In this sense, activities are not just educational because they are conducted in an organised school environment, but they are made educational in and through teachers’ and students’ actions. For expository purposes one could say that the practice of decontextualization is a typical feature of educational discourse, a feature that contrasts with the taken-for-granted context of everyday use of language and tools. This tension between different practices find its’ expression in the practical problem of contextualizing utterances and actions (Gustavsson, 1988). In our view student’s misconceptions or lack of appropriate problem-solving strategies, can just as well be attributed to tensions between different communicative practices, as to their individual reasoning abilities. These practices of decontextualization, or perhaps the term recontextualization would be more appropriate, which nevertheless are shaped by a particular context, could be expected to be an important reason for breakdowns in processes of meaningful communication, and hence for the trajectories of learning and development.

The regularity of social interaction, which we only alluded to above, implies that different actions set up different expectations of what are conceived as relevant actions from others. If actions do not conform to these patterns of interaction, i.e. that questions are regularly followed by answers, the participants will perceive the action as being just that even so. Even if it is not a direct answer, it is understood to be a comment on the question in one way or another. There is no escape from the fact that participants will orientate to what others say or do. Therefore, the meaning of a particular utterance in talk will depend on how it is responded to by others. Analytically it is therefore difficult to categorize one utterance as a question without taking the sequential unfolding of the talk into account.

Utterances are oriented to and contextually shaped by previous talk, and they provide context for further contributions. This context is continually established and redefined and meaning is as such negotiated and never pre given or finally settled. Whether a question is to be characterized as a proper question depends on the collaborative accomplishment of the acts of questioning and answering. If the utterance is to be classified as a question we, as analysts, have to examine the sequence in order to see how the other part responds. Then it is possible to categorize it as the speech act of questioning. This dynamic and dialogical nature of talk also works in reverse. The answer to an utterance may recast the meaning of the utterance to which it responds. As such, to respond to a question with an acknowledgement is to try to make the first part a request. To answer the question “have you cleaned your room?” with “yes, I have cleaned my room” would make it into a proper question. To say, “*it’s not my turn*”, would turn it into an accusation and so on. This illustrates the finely tuned context-dependent and context-renewing nature of social interaction (e.g. Antaki, 1994). Before we develop these arguments further it is necessary to give a short account of Clark and Brennan’s theory.

### **LANGUAGE IN USE**

According to Clark and Brennan (1991), all collective actions are founded on common ground and its accumulation. Common ground is the knowledge that two or more participants in communication have in common or assume they have in common, and this common ground is continuously updated and developed through the process of *grounding*.

Grounding is essential to communication. Once we have formulated a message, we must do more than just send it off. We need to assure ourselves that it has been understood as we intended it to be. Otherwise, we have little assurance that the discourse we are taking part in will proceed in an orderly way (Clark and Brennan, 1991:147).

There are two important factors that shape grounding, the first being the intentional purpose of the activity, that is to say, what the interactants are actually trying to accomplish. The second is the medium of communication, or the techniques available within each medium as well as the costs involved.

Obviously, there is never complete symmetry in understanding among different individuals, and the necessary shared knowledge is dependent on the activity being performed. Clark and Brennan describe this as *the grounding criterion*, which means that common ground is relative to the common understanding necessary for performing successful communication and action. This criterion is established by the participants, and tends to be guided by what Clark and Brennan describe as the principle of least collaborative effort. This means that participants take the trouble that is necessary to get their meaning across to the other interlocutors and thereby, in the course of the interaction, contribute to the solving of different tasks.

On a micro-analytic level Clark and Brennan make a distinction between two phases in communication. These are the presentation phase and the acceptance phase, which are intimately related in the sense that the acceptance phase provides evidence of the fact that your interlocutor has understood or perhaps misunderstood what you were trying to convey. To put it differently, one could say that the answer supports or undermines your reading of the other participants mind, which, because you are able to communicate, already contain a certain amount of commonly shared cultural knowledge. Participants always look for positive evidence of mutual understanding, and the establishment of common ground is due to active work by the different parties in conversation, in the sense that you actively have to display your intentions as well as read your interlocutors intentions. Participants must continuously pay attention to the others' contributions and acknowledge their utterances, as well as seek the others' acknowledgement. Further, there is a need to monitor the conversational flow and respond with the relevant information at the relevant point in the conversation.

While Clark and Brennan's model to a large extent focuses on cognition and how individual intentional knowledge is synchronized and developed in discourse, the situated or discursive action approach focuses on action. Cognitive issues such as remembering, reasoning, attributing and so on are reformulated as belonging to a social world of interdependent relationships. Operationally, cognition become reports, descriptions, accounts, formulations, arguments, explanations and so on, and the inferences they make available. Such matters are situated in activities and are closely intertwined with other matters of concern. To provide some structure we will emphasize three points: *action, fact and interest, and accountability*.

The first point is that cognitive phenomena are recasted as actions. "Discursive psychology generally is concerned with people's practices: communication, interaction, argument; and the organization of those practices in different kinds of settings." (Edwards & Potter, 1992:156). The concern is with how people carry out reasoning and problem solving as part of their practical activities. Analytically we, as researchers, should be careful with applying analytical categories to do with phenomena such as degrees of shared knowledge, depth of understanding and impact of technology on discourse, and instead be sensitive to what social actors actually do through talk and text.

The second point highlights how discourse is always produced from a position, which is to say that it has a rhetorical organization. It is people situated in space and time, with different interests, stakes and concerns, who produce actions. Actions are therefore never neutral in any simple sense; they are produced with specific goals in mind. These, however, are features of the content and organization of discourse, not of people's individual motivations or thoughts. This means that people treat each other as competent knowledgeable members with motivations, abilities and interests, and that these concerns are displayed in their discourse. An important objective in discourse analysis is to analyse the organization of these actions, as well as identify the devices that the participants rely on to accomplish this in different settings.

The last point concerns accountability, that is to say, speakers routinely deal with issues of agency and responsibility when giving accounts or descriptions of events and other phenomena. How teachers orient to accountability when providing assessments of pupils, would be an interesting topic to pursue further. When pupils fail to accomplish a task, is this attributed to bad teaching or to the pupils' lack of reasoning ability? These are common concerns in teacher-pupil interaction. In this regard educational discourse is about social relationships, where issues related to pupils learning and abilities, are practical concerns for the teacher, and do not refer merely to what the pupil actually know. In this regard the pupils' "thinking" is interlinked with a matrix of social relationships and concerns.

To sum up, the focus of this approach is not on cognition conceived as psychological entities located "under the skull", but on discourse and its sequential organization grounded in people's activities and social practices. We, as analysts, are interested in how specific formulations are deployed, and how they are related to the particular context in which they appear. This context is established in activities that are pragmatically organized.

Therefore, instead of considering cognition, problem solving and remembering as merely psychological phenomena, they enter into this model as discursive resources which teachers and pupils use to do specific interactional work. People think together and engage in collaborative activities by continuously trying to understand each other's motives, understanding and ideas.

## COMPARISON OF THE TWO APPROACHES

We have argued for an understanding of shared knowledge as something that is actively constructed and used for various pragmatic purposes in discourse, and as such, it is not a category that actually describes the knowledge people have in common. We as analysts should never ask, "what is the exact content of the shared knowledge in this particular activity?" This is a question that cannot be answered from a discursive action point of view. Intersubjectivity is first and foremost a

concern for the participants in discourse, and it is our job as analysts to conceive how they achieve this joint understanding and what kind of local, situational and pragmatic work it involves. That some context is jointly held can be observed, however, in interaction. By subsuming the notion of shared knowledge under what we have termed ‘pragmatic intersubjectivity’ (Edwards, 1997), it is treated as something that is at stake for participants in the communication, it is what they treat as shared and how this is related to the local and pragmatic context of the discourse.

Our main criticism of Clark and Brennan’s model is that it retains a communication-as-transfer-between-minds view of language<sup>4</sup>. Secondly that it treats intentions and goals as pre-existing psychological entities that are later somehow formulated in language. This gives rise to conceptual and methodological problems, which largely can be avoided by reformulating the issue as dealing with pragmatic intersubjectivity. As mentioned above, meaning can be packed and described in variable ways, and what meanings different words take on, depend on where the word is located and how it is taken up in discourse. We have already said that doing questioning is an interactive and dialogical accomplishment, not something that pre-exists as an intention, which is then put into words. Analysing intersubjectivity as a practical concern of the participants, tied to social action instead of cognition, has methodological advantages, even if these are bought at the expense of simplicity. From the communicational model point of view, the explanatory burden is placed on an unobservable and private domain of the mind, while in the latter discursive action approach; the phenomena of interest are arguably present in the discourse. Treating discourse as a window on cognition contrasts with the indexical nature of meaning, a notion that is so central in the situated action approach. According to this view there is a loose fit between words and their referents, something which makes language into a flexible resource that can be tailored to fit different pragmatic concerns.

## THE PRACTICAL MANAGEMENT OF INTERSUBJECTIVITY IN EDUCATIONAL DISCOURSE

In the following section we discuss the notion of intersubjectivity in the context of educational discourse. We use material from our own research on the educational use of multimedia in schools. We focus on a central aspect of intersubjectivity: the situated production of educational goals and the role of technology in this connection.

The following scene is quite common to many pupils and students trying to use the Internet for educational purposes, and it illustrates difficulties with finding appropriate information on the Internet. Before this particular dialogue occurred, three 14-year-old girls had spent a couple of hours searching the Internet for material about the situation of women in Africa. They were supposed to use a video about women in Burkina Faso to define themes and “research questions” for their project work. Before this sequence they had already defined and formulated their themes of study.

The class was divided into groups of 3-4 pupils each, which worked in separate rooms. The teacher rotated between groups to see how they were getting on, but this group did not summon her. The dialogue starts as the teacher enters the room.

### *Excerpt 1*

1. Teacher: How are things going here?
2. Monica: No, we think it is difficult. We cannot find much material
3. Anne: What we found was a legal bill concerning polygamy in Uganda, but we cannot enter that website.
4. Teacher: But how do you define the basic themes of your study?
5. Monica: How much do African mothers decide over their son’s family.
6. Anne: Or to what extent they have the right to decide.
7. Cathrine: How much they decide, that’s it.
8. Teacher: There may be something wrong with your themes of study, if you can’t find any material on it. Because it is evident that a lot of this is unwritten laws and rules so that...may be you should add two or three more questions.
9. Cathrine: But what else is the video about?
10. Teacher: It has to do with women’s rights.

This extract is in many ways representative of instructional discourse, and, as such, it is interesting to relate it to important findings in the literature on teacher-learner interaction. A robust finding is that this kind of discourse is characterized by

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<sup>4</sup> We are not denying that transfer of meaning takes place. What we want to highlight is that a model, which emphasizes transfer, is methodologically and conceptually problematic and misleading, basically because it neglects or overlooks the fundamental insight of the situated and constructive character of learning and meaning.

asymmetric interactional patterns controlled by the teacher (Edwards & Mercer, 1987, Mehan, 1979, Nystrand, 1997, Wertsch, 1998).

This relationship is articulated in several ways, i.e. in the teacher's right to ask questions and the pupils' obligation to answer, and in the more basic social asymmetry between 'those who know' and 'those who do not know'. It seems obvious that this asymmetric pattern is an important feature of intersubjectivity. The crucial question is however how we should approach this phenomenon in a fruitful manner. Or to put in a more precise way related to our topic: how do we study "teaching goals" and the ways participants "understand" and relate to these goals?

First, the above dialogue can be approached as a situated speech exchange *producing pragmatic intersubjectivity, i.e intersubjectivity as the participants practical concern*. The pupils approached their problem as a *search-and-seek problem* when they found a reference to an important text, but could not find this on the World Wide Web (line 3). The teacher expressed the view that the pupils probably would not succeed in finding material unless they redefined their searching criteria as well as their basic way of stating and formulating the problem. These different perspectives on goals, task and problem solving procedures, are only meaningful in this particular context, and are also produced, developed and changed throughout. According to Baker et al. (1999:51) it is theoretically assumed in most CSCL research that the goals do not undergo any change in collaborative learning situations. Baker attributes this flaw to the short timescale of the activity considered in many studies. We agree with Baker et al's main argument. Our example indicates not only that there are changes in goals, but also that goals are part of the situated production of intersubjectivity. However, in contrast to Baker et al., we believe that this change in goals is even apparent on a 'limited' timescale, such as in the activity reported above.

Second, there is as mentioned a striking asymmetry in the dialogue, reflecting not only that the participants have different goals and views concerning how to continue the work, but also that social roles and power relations are produced and reproduced. From our perspective we do not take this power structure for granted as pre-defined "common ground", but will instead focus on its production and realization in situated practices. We learn from the literature that there is often some asymmetry present, but "asymmetry" is a very abstract notion that contributes less to an understanding of the actual production and reproduction of social relations. Applying a discursive approach, we observe that the teacher did not directly respond to the student's diagnosis of the problem, but instead introduced a completely different issue, the basic work of formulating and defining the goal of the project work, i.e. their themes of study. Rather than saying that the goals are negotiated in this discourse (which is a fairly common phrase in the literature on goals in social settings), it seems more appropriate to characterize the teacher's utterance in line 4 as a kind of *rhetorical conversational device* aimed at redefining the foundation of the dialogue. It seems reasonable to see the teacher's rhetoric intervention as a kind of *prolepsis* which Michael Cole (1996) describes as a possible instructional strategy in which the teacher, centered in the present tense of an activity, is both "looking backward, looking forward" (p. 185). The teacher's intervention focuses on a matter that the teacher presumes the students will have to address in order to solve the task. This rhetoric device is shown to have a concrete interactional function. The teachers wants (line 9) the themes of study to be defined more focused on womens' rights.

Third, it may be disputed that this dialogue led to identifiable "common ground" in terms of clearly detectable goals as "rules" governing the social and discursive process. Rather, the concept of "goal" should be understood as a part of an ongoing interactive process, which is defined and redefined throughout. The students' diagnosis of the problem is not met with any kind of detailed counter-arguments explaining 'why their approach may be wrong. Rather than explicitly relate to the students' formulation of their problem, the teacher, in an ostensibly un-socratic and rhetoric way, (Billig, 1987) started to talk about something else – the pupils' way of presenting and formulating their problem. This is what prolepsis is about, without being explicit, the teacher asks a question that makes the students work in new, specific directions. The pupils are expected to exhibit their themes of study, and they demonstrated that they were not quite sure what these formulations were. There is no doubt that there is an important development in this extract regarding fundamental goals, but it is less meaningful to characterize this as "grounding" in the sense that the participants are getting closer to some kind of mutual understanding of the goals. It seems more appropriate to say that the students adopted the teacher's basic notion of what should be considered a proper goal.

At this point our analysis also resonates with Matusov (1996) who argues that traditional definitions of intersubjectivity overemphasize agreement and consensus and de-emphasize disagreement among participants in joint activity. With Matusov (1996) and Billig (1987), We consider disagreements and contradictions in communication to be fundamental in the study of social interaction and intersubjectivity. But, in contrast to Matusov, we do not consider disagreement as a general, inherent feature of communication. Rather, we consider it to be interesting only if it plays a significant part in discourse – as a topic in the participant's collaborative construction of meaning.

Fourth, the excerpt is part of a larger project undertaken by this class over a period of one week. It is important to note that this very dialogue, and especially due to the teacher's intervention, was an important milestone in the group's work because it led to a shift of focus and redefinition of their work, which proved productive from an educational point of view in the sense that the group accomplished what was expected from them. The group redefined their themes of study and changed

their focus in a way, which among other things, caused them to successfully redefine their criteria for search on the internet. The redefinition of the overall goals led them to formulate searching criteria that were relevant to their problem solving. But the change of goals was not due to any identifiable change in some out-of-context or decontextualized mutual understanding; It was specifically related to the fact that the teacher told them to redefine the goals.

### Reflections on “a computational model for grounding”.

This process of goal setting and goal production seems to be locally produced, and it can be argued that it can hardly be generalized and "theorized" in a traditional way because the phenomenon itself is said to be inherently situated and would almost by definition avoid any kind of abstraction and theorizing. Interestingly, this kind of theorizing is an important goal for Baker et al. when they argue that it is relevant to develop:

...a computational model of grounding...In this model, utterances are seen as the performance of particular kinds of speech acts (such as initiate, continue, repair and acknowledge) that change the state of groundedness of some information. The model allows one to form a precise theory (which may still turn out to be incorrect) of what is grounded and what actions need to be performed to achieve grounding at any point in the conversation. (Baker et al 1999:38)

This kind of theorizing is based on the fundamental premise that "common ground" is actual, objective and identifiable as bits of information available for out-of-context computational formalization. What this notion of actual, shared knowledge does not take into account is how all these things (shared knowledge, experiences, linguistic evidence etc) are potentially capable of being described in several ways.

With a parallel to the lively discussion regarding the closely related concept of internalisation (e.g. Wertsch, 1993, Wertsch et al., 1995, Säljö, 2000), it could be maintained that grounding, in the sense Baker et al. and Clark define it, is problematic because it encourages us in a search for internal concepts, rules and other mental entities. The very idea of grounding presupposes that some kind of cognitive agreement is provided by the assumption that the actors share a system of culturally established symbols and meanings. Different definitions of situations may occur, of course, but these are handled as conflicting subcultural traditions or idiosyncratic deviations from the (culturally established) cognitive consensus.

In contrast, we agree with Garfinkel (1967) and Wittgenstein (1953) that the order and stability of the social world is not a consequence of a "cognitive consensus", some objective "common ground" or due to an "underlying structure". It is rather a result of situated actions that create and sustain shared understandings on specific occasions in interaction. Shared knowledge should therefore be considered an emergent product of situated action, rather than as its foundation.

## MAKING SENSE OF TECHNOLOGICAL TOOLS

The context and participants of the next excerpt is the same as for the first, but it occurred later in the project. In this particular activity the pupils used a particular software tool called Syncrolink, a tool designed to support the construction of multimedia presentations. How the pupils made sense of the technology is shown to be a relevant clue pointing towards the issue of practical management of intersubjectivity.

### Excerpt 2.

1. Monica: OK, then we start. Let's play (*the video*) now.
2. *Video starts.*
3. Cathrine: Where shall we insert a link? (*in the video*)
4. Monica: Perhaps after it is said that "The mother has decided". Then we write that this is a "typical example of the power of the mother-in-law."
6. Cathrine: (*writes*) "The mother-in-law" is in power.
7. Monica: No, don't stop, just push PLAY
8. Monica: Here it is "Do as I say, obey".
9. Carhrine: Then we know that, it is 42160, write it down .
10. *Monica writes the number for an exact location of the link to the video.*
11. Cathrine:Then we exit this (*The multimedia tool*) and enter (*enters the editing tool*)  
"Front page"
12. Monica: (*writes*) "This is a typical example of the power of the mother-in-law in the home"

The video presented a filmed dramatization focusing on the important role and power of the mother-in-law in Burkina Faso. The initial pedagogical idea for this project work was that the pupils should learn more about other cultures and races in

general, and the situation for African women in particular. In this context the intentional role of the technological tool was to support the pupils in their activity.

The technology was quite complex and the pupils had to use and navigate between different types of technologies (the multimedia tool, writing on paper, an editing and writing tool and file management). The crucial task in this excerpt was "linking", which meant that the pupils were supposed to use the multimedia tool to edit and comment the video by inserting relevant links at appropriate places. A "link" would typically be an additional and supplementary text. The excerpt shows that the pupils' main *practical* goal was to use the multimedia tool to insert links in the video (see lines 1, 2 and 3). Immediately after the start of the video, one pupil asked, "Where shall we insert a link?" The others did not dispute this question, a question that also implicated an establishment of a goal in the joint activity. On the contrary, its relevance was confirmed by the next reply, which proposed precisely (line 9) where a link could be inserted. In this way the technology became both the means and the goal in the pedagogical process. Of course, the central question is how to account for this focus on a technologically derived goal that was different from the goal defined by the teacher. It is a consequence of the ways the pupils themselves made sense of the multimedia tool, a tool that was developed and dedicated to the production of links.

The production of goals as well as intersubjectivity is here shown to be practical accomplishments by the participants. Taking the pedagogical situation and the technological environments into account, the pupils tried to make sense of the whole process of project work. In this regard, if we accept the principle of least collaborative effort, which implies that the participants will try to minimize their collaborative effort (Clark & Wilkes-Gibbs, 1986), the concentration on the insertion of video links is perfectly understandable. *Not* to focus on the production of links was certainly possible and was encouraged by the teacher, but our data indicate that the *rationale* for the whole learning environment was dedicated to the production of links. But this rationale is not something objective, out-of-context, or pre-defined, rather, it is produced, situated and subjective – as a result of accountable human action interplaying with a technology with particular features and constraints.

## CONCLUDING REMARKS

In the CSCL community due attention has been devoted to Clark and Brennan's conceptual framework, and several authors have developed it further (i.e. Baker et al., 1999, Dillenbourg, 1999). In the paper we have outlined and argued for an alternative understanding of communication and language-use, emphasizing the situated and pragmatic character of sense-making practices. By subsuming the issue of shared knowledge under what we have termed pragmatic intersubjectivity, we are better enabled to grasp the complexity and indeterminacy of joint activity. This is due to the fact that we do not have to look beyond social practice, to mental entities and the like, to describe the phenomena of interest. The phenomena are arguably there in the discourse. In our first analytic example we demonstrated how the consensual understanding between teacher and pupil's were produced and locally tied to specific pragmatic concerns related to the establishment of criteria for information seeking on the Internet. In the second we illustrated how pupils made sense of a multimedia software tool in a practical pedagogical setting, and how the use of the software was tied to pragmatic concerns connected to the solution of a particular task.

In the introduction we pointed out that the development of models of shared knowledge to guide systems design, have been keenly discussed in the CSCL-community. Even though we do not take up this issue in the paper, we believe the general argument can throw light on this contentious discussion. We have already argued against ideas of computational models and formalizations of "grounding", which seem to be based on a notion of shared knowledge as an objective and identifiable prerequisite for human communication. If such ideas gain momentum in the CSCL community, it would certainly pave the way for more abstract and theory driven systems design. It is not our view that general models are analytical dead ends in CSCL-research. Prescriptively they can function as heuristic artefacts that support the design of new tools in diverse ways. However, our concern is that such models can become reified descriptions of actual human practice. In our view there is nothing to bear out an assertion of that kind.

In several respects our approach resonate with Suchman's criticism of Winograd and Flores' technological implementation of a speech act model of language use (Suchman, 1994). Winograd and Flores' argument is that theoretically driven design not only will produce ordered technology that is easily implemented, but also that the field of human practice has to adapt to this coherent structure of action. Suchman, however, emphasizes that the success of such applications just as well can be attributed to how it is tailored to fit the situations where it is used. According to this line of argument one should be cautious with theoretically derived and abstractly organized structures of social interaction, which are implemented as predefined categories in technologies. To view the use of such applications as if the field of human practice has to adapt to this abstract logic, contrasts with peoples' skillful ways of applying technologies to fit practical situations of use.

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## REFERENCES:

- Antaki, C. (1994) *Explaining and Arguing. The Social Organization of Accounts*. London: Sage.
- Arias, E., Eden, H., Gorman, A., & Scharff, E. (2000): Transcending the Individual Human Mind - Creating Shared Understanding through Collaborative Design. *ACM Transaction on Computer-Human Interaction (TOCHI)* Vol.7, No. 1, 84 - 113.
- Atkinson, J. M. & Heritage, J. (1984). *Structures of social action*. Cambridge: Cambridge University press.
- Baker, M., Hansen, T., Joiner, R. & Traum, D. (1999): The Role of Grounding in Collaborative Learning Tasks. In Dillenbourg, P. (Ed.): *Collaborative Learning: Cognitive and Computational Approaches*. Amsterdam: Pergamon.
- Billig, M. (1987) *Arguing and thinking. A rhetorical approach to social psychology*. Cambridge: Cambridge University Press.
- Button, G., Coulter, J., Lee, J. R. E. & Sharrock, W. (1995): *Computers, Mind and Conduct*. Cambridge: Polity Press.
- Clark, H. H. & Brennan, S. E. (1991): Grounding in Communication. In Resnick, L., Levine, J. M. & Teasley, S. (Eds): *Perspectives on socially shared cognition*. Washington: American Psychological Association.
- Clark, H. H. and Wilkes-Gibbs, D. (1986): Referring as a collaborative process. *Cognition*, **22**. 1-39.
- Cole, M. (1996): *Cultural Psychology. A Once and Future Discipline*. Cambridge MA & London: The Belknap Press of Harvard University Press.
- Dillenbourg, P. (1999): What do you mean by collaborative learning? In Dillenbourg, P. (Ed): *Collaborative learning: Cognitive and Computational Approaches*. Oxford: Pergamon.
- Dourish, P. & Button, G. (1998): On "Technomethodology": Foundational Relationships between Ethnomethodology and System Design. *Human-Computer Interaction*, Vol. **13**, 395-432.
- Edwards, D. (1997): *Discourse and cognition*. London: Sage.
- Edwards, D. & Mercer, N. (1987): *Common Knowledge. The Development of Understanding in the Classroom*. London: Methuen.
- Edwards, D. & Potter, J. (1992): *Discursive psychology*. London: Sage.
- Garfinkel, H. (1967): *Studies in Ethnomethodology*. New Jersey: Prentice-Hall Inc.
- Gustavson, L. (1988): *Language Taught and Language Used. Dialogue processes in dyadic lessons of Swedish as a second language compared with non-didactic conversations*. Linköping Studies in Arts and Sciences. No. **18**.
- Heritage, J. (1984): *Garfinkel and Ethnomethodology*. Cambridge: Polity Press.
- Matusov, E. (1996): Intersubjectivity Without Agreement. *Mind, Culture and Activity*. Vol 3, No. **1**. 25-45.
- Mehan, H. (1979): *Learning Lessons. Social Organization in the Classroom*. Cambridge, MA. & London: Harvard University Press.
- Nardi, B. (1996): *Context and Consciousness. Activity Theory and Human Computer Interaction*. London: MIT Press.
- Nystrand. M. (1997): *Opening Dialogue. Understanding the dynamics of Language and Learning in the English Classroom*. New York: Teachers College Press, Columbia University.
- Säljö, R. (2000): *Lärande i praktiken. Ett sociokulturellt perspektiv*. (Learning in practice. A sociocultural perspective) Stockholm: Bokförlaget Prisma.
- Suchman, L. (1987): *Plans and Situated Actions. The Problem of Human Machine Communication*. Cambridge: Cambridge University Press.
- Suchman, L. (1994): Do Categories Have Politics? The language/action perspective reconsidered. *Computer Supported Collaborative Work*, **2**, 177-190.
- Wertsch, J. V., (1993): *Voices of the Mind. A Sociocultural Approach to Mediated Action*. Cambridge, Mass.: Harvard University Press.
- Wertsch, J. V., del Rio, P. & Alvarez, A. (1995) *Sociocultural Studies of Mind*. Cambridge: Cambridge University Press.
- Wertsch, J. V., (1998): *Mind as Action*. New York: Oxford University Press.
- Wittgenstein, L. (1953): *Philosophical Investigations*. Oxford: Basil Blackwell