



## Talking about distributed communication and medicine

On bringing together 'remote' and 'local' actors

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# Talking About Distributed Communication and Medicine: On Bringing Together Remote and Local Actors

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## ABSTRACT

In this commentary we reflect on the articles in this special issue on computer-mediated communication (CMC) “about things.” We do this from our perspective as researchers of the sociotechnical practices of developing, using, and evaluating information technologies for health care work. The relevance of the articles for a medical setting is evaluated, and we also indicate that the material embeddedness of CMC should be “unpacked.” By focusing on the materiality of CMC in its working practice, we can see the otherwise invisible work that performs the ecology needed to “make a CMC work.” Only when seeing these activities, and when realizing the risks of possible miscommunications, can we assess the desirability and feasibility of (telemedicine) CMC projects.

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## 1. INTRODUCTION

In fields as varied as airplane design, banking, and medicine, there is an increasing interest in computer-mediated communication (CMC). Various parts of an airplane may be developed in remote locations and still need to fit the larger design, or a medical specialist may assist an operation carried out in a different location by “virtually being there.” The promise of such distributed communication is that it is possible to redesign existing work practices to procedures in which there is no need for the physical co-location of all actors and in which the quality of the product being delivered will be maintained or even improved. As a concurrent movement, there is a widening interest in thorough assessments of actual practices of such communication and the way people talk about things *through* things. This special issue on “talking about things” is a vivid example of this interest. Rather than obscuring problems, possibilities, and alterations that are engendered by CMC about things, the authors of the articles in this issue focus on exactly these matters. They empirically describe and assess communication practices to get a feel for the mechanisms that come into play when people are cooperating by means of CMC and translate these findings into relevant design implications.

One of the aspects addressed in these articles is how a person in one location can make sense of activities taking place in another. In their contribution to this special issue, Luff et al. (2003) deal with this question by demonstrating how a “remote” participant is trying to “get the point” of what is going on in a room where a “local” participant is situated. To link the two locations, the authors use GestureMan, a robot, who, by linking local and remote participants, hosts cameras and transmits images to screens and thus facilitates joint communication about objects.

Just as in the case of GestureMan, the representations of activities taking place in experiments or studied work practices that are local are made accessible to us, as remote participants, through this special issue. And although the contributors to this issue—the local participants—display a number of possibilities and problems of these kinds of distributed communication, we see the distributed nature of our communication with the authors as characterized by the freedom to reflect on their work from our specific perspective.

Our “screen” is demarcated by our field of study: the sociotechnical practices of developing, using, and evaluating information technologies for health care work. In the light of our knowledge of this field, we discuss the relevance of the matters brought to the fore in this issue, and—like in the example of *GestureMan*—we try to “get the point” of what the presented articles can tell us about CMC in relation to a medical setting. By defining our screen as such, we frame our contribution to the communication with the local participants in a way that indicates the significance of their work for this particular medical practice. In doing so, we feed back to the local participants, the authors, some general insights that emerge from this mediation through telemedicine.

Finally, we would like to contribute to the communication by reflecting back to the local participants some aspects that we feel remain underexplored in their discussion on distributed and mediated communication, that is, the need to “unpack” that which makes CMC possible in the first place: its material embeddedness. This unpacking should take place by describing and analyzing the immense amounts of work, visible and invisible, that need to be done by all actors (human and nonhuman) in a setting to make a CMC work. When the sensitivity for how material tools and other actors constrain each other is brought about, there can be a more realistic assessment—although never a full prediction—of how and to what extent a specific design initiative or an implementation project transforms a work situation. A focus on the ecology in which communication can be successful will, for example, frazzle the rhetoric on the distribution of medical expertise to remote areas. Although such initiatives are generally hard to argue against, the risks of the communication being fractured—with, in the case of distributed surgery, possibly dramatic consequences—cannot be underestimated. Where an existing ecology of practice between at times distributed actors may splint the emerging fractures, the efforts required to overcome communication problems without this shared habitat will have to be substantial. By unpacking the embeddedness of CMC, we can assess whether there is a chance that projects offer enough actual benefits to counterbalance the effort needed to turn experiments into working practice.

## 2. DISTRIBUTED DOCTORS

Talking about things by means of CMC in medicine quite easily leads us to the subject of telemedicine. The idea that operations, diagnoses, and other communications about medical practice can be turned into distributed activities has led to a massive investment of energy and funds into this emerging field by governments as well as by private telecompanies (such as Nokia). Many telemedicine projects are fueled by the promise that these developments will reduce the required levels of specialization of local health care pro-

professionals while enhancing overall quality of care (Laires, Ladeira, & Christensen, 1995; Lehoux, Sicotte, Denis, Berg, & Lacroix, 2002). The promise that geographical restrictions become irrelevant by distributing top-quality care to remote areas in Norway or Australia, for example, adds to the rhetoric that drives many telemedicine projects.

What often remains obscure in telemedicine experiments is how the technological mediation that takes place actually alters practices and relationships between health care professionals, between these professionals and technologies, and between care workers and their patients. The proposed technical intervention in many telemedicine projects is seen as a “technical fix” for a commonly perceived problem (waiting times, brain-drain, lack of personnel, etc.). However, even though the promise of telemedicine has been heard for many years now, successful implementations that have significantly addressed any of these problems have hardly been seen. When we want to understand why it has been so hard to capitalize on such a strong rhetoric, we need to focus on the communication and cooperation mechanisms that come into play when technologies are introduced to facilitate distributed medical work. It is here that we see a major role for the ethnomethodological studies on human–computer interaction that this issue exemplifies.

A basic question becomes not merely *if* but *how* communication comes about—or how it does not. As Luff et al. (2003) show in the description of their GestureMan experiment, there are various reasons for the problematic nature of collaboration through CMC. Their overall insight is that the reduction of context through the CMC makes it difficult for the remote participant to “get the point.” The low context density of their robotically mediated communication experiment leads to a fracturing of conduct: “fractured from the environment in which it is produced and from the environment in which it is received.” One of the main causes for these problems can be found, according to these authors, in the fact that it is hard for the remote participant to see both the object the local participant is talking about as well as the conduct of this local participant in relation to it. According to Luff et al., this constitutes a “critical interactional problem” that the actors try to overcome by adjusting their activities in the light of the setting.

When looking at the promises of telemedicine projects dealing with distributed work, for example surgery, these issues of course are highly relevant. It is important for the remote super-specialist to see both the patient and the local collaborators—not just the other specialist. To carry out the surgery, moreover, sensitivity is needed for the changes in conduct that the participants will have to carry out to face this critical interactional problem. In the overenthusiastic telemedicine rhetoric, such issues are often obscured. When we take this communication mechanism into account, a telemedicine initiative does not simply provide a solution to the problems of the distribution of

expertise and quality care over geographically distributed areas. Involving more actors changes the whole sociotechnical setting by changing the material circumstances, the relationships of health care professionals toward each other and toward the patient, and their possibilities for action.

An example of such a situation, where work relations have actually changed as a consequence of CMC, was provided by Margunn Aanestad (Aanestad, in press). She showed how the camera brings about a shift of the work practice toward a performance in front of an audience.

The operating theatre literally became a theatre, a stage, as it originally also was. The patient was the one most immediately affected, by having images from the inside of the body transmitted to the outside world.... The operation team encountered a new work situation, and the discussions around the surveillance issues as well as the wishes for feedback and reciprocity in the communication situation were signs of the shift towards performance aspects of the work. As one of the central persons in the work team the surgeon was affected by being "in front of the camera." The camera made the work more visible and thus might increase the level of pressure to produce good results.

Introducing new technologies into the operation theater thus transformed communication between the professionals and introduced new participants: an audience of other specialists and technicians, who were present to make sure the quality of the image was sufficiently high. Consequently, the work practice changed into a more complex and enmeshed hybrid with new participants and a displacements of goals (not just healing the patient, but also looking good in front of the camera).

A seemingly opposite conclusion than the one presented by Luff et al. (2003) is drawn by Ducheneaut and Bellotti (2003) in their study of the practice of conversing via e-mail in various corporate environments. They marvel at the low context density required by collaborators to get the point. "E-mail conversations, they explain, "are grounded in sufficient mutual knowledge ... to allow very brief, sketchy, and implicit references to succeed without posing significant problems in interpretations." This finding is surprising in the light of the main worries of critics, in the early times of e-mail, about this medium having such low context density. The authors of this article dismiss this critique by showing that e-mail communication does not take place in a vacuum. The authors argue that the common understanding that is needed for the communication to function is prepackaged institutionally through policies and job descriptions. It is at this point though, that the question comes to our minds why the authors have not gone to greater length to assess the localization and embeddedness of the conversations they study.

Their finding, that e-mail conversations are part of a—this time not fractured—ecology, is important. Yet the idea that this ecology is mainly prepackaged in policies and job descriptions hardly seems a sufficient explanation of

e-mail being a well-working communication tool despite its low context density. It completely bypasses the points made in the literature on workplace studies that an ecology is crucially also constituted by informal and invisible work (Star & Strauss, 1999; Suchman, 1995).

The interesting point for us would be to know in what way the e-mail conversations were entangled in work practices, routines, and cooperation patterns but also meetings, breaks, telephones, car rides to visit clients, telephone conversations, and so on. This could tell us something about the level of embeddedness needed for communication to become “grounded in sufficient mutual knowledge” and would point to variations in this knowledge; under what circumstances does the e-mail communication provide sufficient context for a mutual understanding? And when does it not?

These insights are missing in many telemedicine projects. CMC is most likely to work if it is part of a larger and already existing work context shared by practitioners. When such a common understanding is absent, it should at least be realized that much energy is needed to overcome differences in perspective and that overcoming difference would then be an inherent part of the communication. When we are trying to build or extend such a community, it is important to realize that the trust needed for collaboration is a factor that can only be established within an existing habitat; the validity of advice and assistance is judged within this very context (Lehoux et al., in press). Another point that becomes relevant here is that the constitution of such habitats is much more easily realized when the participants and objects in a setting are already geared toward and used to using (digital) images as objects of discussion, than when the imaging of the medical collaboration that is to be accomplished is to be introduced from scratch.

In the experiment carried out by Kraut, Fussell, and Siegel (2003), the authors focus on the role of visual elements as resources for communication when collaborating. They look for “critical elements of space” and wish to develop a video system that provides these elements to collaborators when not co-located. For this they state that the situational awareness of “helpers” (who can be compared to the remote participants in Luff et al.’s [2003] article) is needed for proper timing of the instructions and information given to the “worker” (the local participant). Furthermore, they see conversational grounding as essential to come to a proper understanding of the messages. They carry out an experiment in which a bicycle repair job is to be done by having the worker and helper in the same location, by separating them and making them communicate via (various quality) audio equipment, or finally by facilitating the communication with audio and video.

An interesting finding in their study is that the video-based communication tool led to neither a higher number of completed tasks nor a faster or better quality performance. A first question that comes to mind is if this finding might stem from the level of task complexity in this experiment. Can the

finding that video-mediated communication seems to add nothing to distributed task performance in a bicycle repair job be generalized to more complex settings, such as open-heart or brain surgery? What the experiment seems to suggest is that providing visual clues as such should not be taken as a panacea for solving the possible communication problems that exist in audio-mediated communication. In practice, the actors will find workarounds for the restrictions of audio technology by being more explicit and clear in the oral representations of their actions. This finding supports the local telemedicine projects we are familiar with, where workarounds are always cultivated into being part of the working practice.

Finally, Martin and Rouncefield (2003) study the pilot in banking with video-conferencing with customers and the more established practice of telephone banking. It was in the environment of increasing competition among banks that the RATE (Remote Access To Expertise) initiative was started. The authors very nicely show that the increased access in comparison to telephone banking led to substantial “‘demeanour’ work” by operators, which consisted of “exaggerated smiling, nodding, and facial gestures as well as varied conversational asides and jokes.” The fact that the operator had to carry out a lot more work to guide the customer around the artifact leads the authors to the interesting conclusion that the skills required by participants in CMC to bring the communication about, and to make the other participants get the point, should be acknowledged.

In the case of telemedicine, this finding would become all the more important if we translate this setting of a customer and an operator in the bank to the situation of a Web-cam-based outpatient clinic. Whereas CMC is often presented as an unproblematic substitute for the face-to-face consult, the findings in this study would make policymakers and system developers aware that the workload for the physician would increase substantially and that specific communication skills would have to be developed to make this application work.

To see how these constellations of technology, work practices, and skills have to be reconfigured to be turned into a working setting, and to gain sensitivity for who is doing what work to achieve this, Martin and Rouncefield (2003) are interested in the role of conversation and interaction to see how such activities are organized in a specific technological setting. It is exactly this plea for focusing on the changes in activities and work practices that we find an interesting contribution to what has been stated in the previous articles, and here we would like to return to the relevance of “unpacking” the material embeddedness of particular CMCs.

### 3. CONCLUSION: COLLABORATION AT WORK

An interesting finding concerning the contributions to this special issue is that the two articles that build their arguments on experiments tend to ground

problems related to CMC in the phenomenon of CMC-generated contextual limitations. In contrast, the remaining two articles, which study actual work practices, either find problems due to a profusion of information (Martin & Rouncefield, 2003) or see advantages in the low context density (Ducheneaut & Bellotti, 2003). This difference seems to substantiate the claim that the “fractures” that apparently occur in the experiments are splinted in work practices. Moreover, the experiments attempt to compare “identical tasks” with or without CMC, whereas the very introduction of CMC in a real-world setting more often than not yields or coincides with a transformation of previous tasks (Berg, 1998). This reinforces our preference to study CMC projects “in action.”

In the case of telemedicine, the presentations of promising projects at conferences on medical informatics are often a rather impudent staging of practices that either are not functioning in practice or only function at the price of impressive amounts of extra work to come to a limited result. Sometimes the *demasquee* of such a performance leads to rather painful disclosures of otherwise hidden work. At a conference one of us visited in Copenhagen, the keynote presentation (in front of 600 medical informatics researchers) promised a “live” witnessing of a consultation between a Finnish doctor, in Helsinki, and a patient in Oslo, Norway. At exactly the proposed time, the huge screen in front of the room lit up and showed the quite impressive behind of what later appeared to be a Finnish technician. Bending over to fix a microphone, he was startled by the sounds that were apparently coming from a speaker: the nervous keynote speaker trying to make contact, and the roars of laughter from the audience. Turning around, he bent toward the camera and stuttered that the “doctor would be there shortly.” After a while, the doctor came in, nodded to the camera, sat down, and looked straight ahead to (apparently) another camera, at which time half of our screen changed into the image of a docile, waiting patient, who sat in a chair. We then witnessed a 10-min, clearly rehearsed and fake display of a doctor–patient interaction, in which the patient barely moved and uttered merely “yes,” “no,” or nothing.

Of course, the question of who is doing all this generally hidden extra work to turn an application into a success is an empirical one—and one with considerable political relevance (Star & Bowker, 1995). When we empirically approach and assess CMC projects in workplaces, it becomes clear how immense the advantages of the application need to be for the initiative to be worthwhile.

The habitat of a CMC initiative is not merely something created by the humans implementing or using the tool. It is similarly defined by the technical materials like, for example, the way a lens of a camera or a screen constructs a human with a particular vision. Just like the image-focused nature of some medical practices opens up the possibility to create an image-based habitat,

the technological communication tools are constitutive for the shape of the habitat that is generated. To see both the extra work that needs to be done to make an application work and the way in which application and habitat are constituted, it is necessary to unpack the CMC intervention itself. It is crucial to critically assess precisely what screen generates the results of the experiment or the workplace study. In what way does the technology introduced or used also introduce specific assumptions about the setting, and how are those assumptions visible, not visible or displaced?

It is only by unpacking the technologies in their working practice that we can get a feel for the—until then—invisible work that is not merely done to (re)produce the habitat in which this intervention operates, and we can also start seeing the work that is done in real time to splint fractures in the ecology and continuously perform the setting without which actors start missing the point. Only when we recognize the price that needs to be paid for the performative work that is part of any functioning CMC, and when we realize the risks of possible miscommunications, can the desirability and feasibility of CMC projects—such as telemedicine initiatives—be established.

## NOTES

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## REFERENCES

- Aanestad, M. (in press). The camera as an actor: Design-in-use of telemedicine infrastructure in surgery. *Computer Supported Cooperative Work*.
- Berg, M. (1998). The politics of technology: On bringing social theory into technological design. *Science, Technology, & Human Values*, 23, 456–490.
- Ducheneaut, N., & Bellotti, V. (2003). Ceci n'est pas un objet? Talking about objects in e-mail. *Human-Computer Interaction*, 18, 85–110.
- Kraut, R. E., Fussell, S. R., & Siegel, J. (2003). Visual information as a conversational resource in collaborative physical tasks. *Human-Computer Interaction*, 18, 13–49.
- Laires, M. F., Ladeira, M. J., & Christensen, J. P. (Eds.). (1995). *Health in the new communications age. Health care telematics for the 21st century*. Amsterdam: IOS Press.

- Lehoux, P., Sicotte, C., Denis, J. L., Berg, M., & Lacroix, A. (2002). The theory of use behind telemedicine: How compatible with physicians' clinical routines? *Social Science and Medicine*, *54*, 889–904.
- Lehoux, P., Sicotte, C., Denis, J. L., Berg, M., & Lacroix, A. (in press). Trust as a key component in the use of teleconsultation. *Annals of the Royal College of Physicians and Surgeons*.
- Luff, P., Heath, C., Kuzuoka, H., Hindmarsh, J., Yamazaki, K., & Oyama, S. (2003). Fractured ecologies: Creating environments for collaboration. *Human-Computer Interaction*, *18*, 51–84.
- Martin, D., & Rouncefield, M. (2003). Making the organization come alive: Talking through and about the technology in remote banking. *Human-Computer Interaction*, *18*, 111–148.
- Star, S. L., & Bowker, G. C. (1995). Representations of work: Work and infrastructure. *Communications of the ACM*, *38*(9), 41.
- Star, S. L., & Strauss, A. (1999). Layers of silence, arenas of voice: The ecology of visible and invisible work. *Computer Supported Cooperative Work*, *8*, 9–30.
- Suchman, L. (1995). Representations of work: Making work visible. *Communications of the ACM*, *38*(9), 56–64.

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