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Coordinating action in technology-supported shared tasks: Virtual pointing as a situated practice for mobilizing a response

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ABSTRACT

Drawing on recordings of remote screen-based work meetings in Finland, this conversation analytic study investigates interactive properties of mouse cursor movements in technology-mediated shared tasks. The article illustrates how participants rely on features afforded by the input device in ways that divert from its pre-designed functions to accomplish virtual pointing gestures. These gestures serve as an organizational resource in the precursory phase of action, i.e. when a next on-screen action is observably made relevant. In this sequential environment, pointing by means of the tool is a collaborative resource: an embodied practice for sustaining co-orientation and advancing the sequential progression of the activity. Pointing that co-occurs with first actions such as questions works towards mobilizing a response by projecting relevant nexts and displays the chair's orientation to the respective rights and obligations of the participants.

1. Introduction

This paper is concerned with pointing practices prompted by and embedded in an environment that necessitates the utilization of a technical device (i.e. a computer mouse) as part of its functionality. We demonstrate that in addition to its regular usage, co-participants repeatedly rely on features afforded by the tool, which do not – by design – constitute a default mechanism, and that they draw on them as a resource to refer to on-screen objects, coordinate talk and on-screen action, and mobilize a response in technology-mediated interaction involving shared tasks. These affordances (see Hutchby, 2001), then, are a result of participants' contingent repurposing of technological means, adapted to the practical concerns of the business at hand.

A large body of research on multimodal interaction demonstrates how social conduct is organized through participants' finely coordinated and mutually re-adjusted assembly of bodily and linguistic resources. These resources are "not only used by interactants, but more radically (re)constituted and (re)negotiated by them, being largely occasioned and transformed through their use" (Mondada, 2016, p. 361). They are thus shaped in concert with ongoing activities in ways that explain their

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meaning and the meaning of their utilization. This situatedness includes interlocutors' orientations to the material surround and to objects as part of their interaction. It has been shown, for example, how the achievement and preservation of mutual attention resorts to environmentally coupled gestures (Goodwin, 2007; see also Goodwin, 2000) that are tied to the socio-material environment (Arminen and Auvinen, 2013). Indeed, maintaining co-orientation in collaborative activities largely "relies upon the participant's ability to unambiguously refer to and point at features of objects within her immediate environment." (Luff et al., 2013, p. 6:2). As Luff et al. (2013) emphasize, these referential practices are characterized by their reflexive relationship with the local setup and at the same time rely on addressees' capacities to draw on that relationship in recognizing their possible meaning. Similarly, the local and social specifics of the environment can be made relevant through activities that revolve around actual manipulation of material objects. Objects in interaction may become incorporated into interactional tasks, furnished with new (i.e. additional) meaning. For example, tools, such as surgical hooks and scissors, pens, or trowels, can be employed as pointing devices in ways that are adjusted to current and projected activities, thereby contributing to the management and progressivity of communicative events (Mondada, 2014a, 2016; Goodwin, 2003; see also Nevile et al., 2014). This signifies a reflexive linkage, where tangible objects entail a range of interactively relevant uses for co-participants, which are seized and at the same time shaped and synchronized in accordance with ongoing activities.

This paper contributes to this line of work by analyzing interactive properties of mouse cursor movements in task-oriented talk. Our aim is to call attention to and provide a detailed account of a type of environmental coupling that is entirely screen-based. To this end, we use recordings of weekly, technology-mediated follow-up meetings of a dispersed group of team members working in IT who together monitor, discuss and review the status of their unit's ongoing customer projects and tasks that are documented and managed in their company's intranet. The particularity of these remote meetings is that the attendants do not see each other, but rather share a view of the intranet on their computer screens, while it is operated by one of the participants (a designated "chair"). This entails visibility of the respective chair's on-screen activities, as she or he navigates the browser and updates information in the intranet in accordance with the ongoing conversation. The focus here, then, is on pointing practices tied to this virtual ecology such that they transform and are shaped by design features of the tool in use – enabling the chair to produce diverse pointing 'gestures' on-screen, while attending to the system and to shared tasks. Shared technology-supported tasks constitute complex activities in that they demand coordination of different modalities, participation frameworks, and interactional spaces (local and virtual). Such activities provide worthwhile insights for the study of pointing as they make visible the methods through which participants define relevant spaces and locate pertinent objects and phenomena, thereby working to establish and maintain mutual orientation to the current job (see e.g. Hindmarsh and Heath, 2000; Goodwin, 2003).

In broader terms, then, this paper is concerned with pointing achieved through the use of a technical device (i.e. a computer mouse), manifested as cursor movements or positioning on the screen, in coordination with talk. Drawing on conversation analysis (e.g. Heritage, 1984; Sidnell and Stivers, 2013; Mondada, 2014a, 2016; see Arminen et al., 2016, and Mlynár et al., 2018, for overviews of recent CA-research on technology-supported communication), we show how participants resort to the technological and material ecologies of the settings to accomplish virtual pointing gestures. We demonstrate how these gestures serve as an organizational resource in the pre-monitoring phase of action, i.e., when a participant (the chair) is visibly preparing for the next on-screen action (Arminen, 2005). In this sequential environment, the chair's mouse cursor movements that co-occur with talk may not only foreshadow future actions in the system (clicking), but also display an orientation to teamwork and the participants' rights and obligations for making decisions about updates and changes in the intranet. Pointing by means of the tool, then, is a collaborative resource: an embodied action that serves to organize interactional space, establish and sustain co-orientation and advance the sequential progression of the activity by visibly preparing for the implications of a projected response.

2. Pointing – previous research

Pointing has received considerable attention in earlier research on gestures in interaction (e.g. Hanks, 1992; McNeill, 1992; Kita, 2003b; Kendon, 2004) – and across disciplines (see Kita, 2003a). Most notably, interactional approaches to pointing practices have shown that pointing is an ongoing, interactive and multimodal accomplishment, done through constant adjustments with co-participants' bodily conduct and orientations (Hindmarsh and Heath, 2000; Mondada, 2007, 2014b). Essentially, pointing works as a resource for establishing and maintaining shared focus on an object of attention (see e.g. Goodwin, 2003, 2006; Kendon, 2004). This makes pointing particularly interesting for studies of interaction between instructor and learner (Majlesi, 2014; Goodwin, 2003) or doctor and patient (Stukenbrock, 2008) as well as among professionals (Hindmarsh and Heath, 2000; Luff et al., 2013; Mondada, 2007, 2014a). Studies of workplace interaction further highlight the role of pointing in the participants' efforts to establish and manage co-orientation in shared tasks (see e.g. Hindmarsh and Heath, 2000; Goodwin, 2003, 2006). Pointing and gaze are carefully coordinated with verbal utterances to perform actions through which participants "establish for each other how a relevant space should be construed" (Goodwin, 2003, p. 220), locate common referents in the surround, and constitute the sense and

local relevance of objects, such as documents or screens, for the activities and sequential environments in which they are used (Hindmarsh and Heath, 2000).

Pointing gestures are accomplished through utilization of multiple semiotic resources, including tools and technology (see e.g. Goodwin, 2003; Spagnolli et al., 2005; Knoblauch, 2008; Mondada, 2014a), and can take a variety of forms. As McNeill (1992) observes, "any extensible object or body part can be used, including the head, nose, or chin, as well as manipulated artifacts" (p. 80; see also Clark, 2003; Goodwin, 2003; Kita, 2003b; Kendon, 2004). However, different types of pointing are associated with different pragmatic functions (see Enfield et al., 2007; Kendon, 2004; Frobenius, 2013), and even the ways a tool is integrated into pointing gestures can convey specific meanings. Other than pointing with the back of a pen, for example, pointing done with the tip projects writing or drawing, which in turn mirrors participants' rights and obligations in institutional talk involving orientation to maps and papers (Mondada, 2014a; see also Mondada, 2016). As a situated activity, pointing is particular to the interactional environment in which it occurs (see for example Hindmarsh and Heath, 2000; Goodwin, 2003, 2006; Mondada, 2007, 2014a, 2016; Frobenius, 2013). Studies of pointing in narratives, for example, have shown that a referent can also be abstract, brought into being with the help of pointing gestures (McNeill, 1992, 2003; McNeill et al., 1993; Haviland, 2000; Kendon, 2004). Overall, research highlights the embedded nature of pointing. Pointing as a multimodal practice involves and obtains its meaning through a number of communicative resources, including the ecology of the current activity at hand (Goodwin, 2003; Mondada, 2007, 2014a, 2016).

While research drawing on ethnomethodology and conversation analysis is increasingly concerned with the achievement of mutual attention in settings involving technology (e.g. Hindmarsh and Heath, 2000; Luff et al., 2003; Luff et al., 2013; Luff et al., 2016), most work on pointing still focuses exclusively on face-to-face interaction. However, especially video-mediated interaction among dispersed members can pose challenges with regard to pointing, because participants need to find ways to integrate and make available to each other the environments their activities relate to (Luff et al., 2003; Luff et al., 2013; Hjulstad, 2016; see also Heath and Luff, 1991, 1993, 2000). Considering the omnipresence and increasing relevance of information and communication technology in everyday life, pointing in technology-mediated interaction is still understudied from a conversation analytic perspective. Surprisingly few scholars have paid attention to the ways pointing practices are adapted to and integrated with technology-use, i.e., how pointing is accomplished by means of a technical device and the functions it serves in technologically supported activities. As research is beginning to unveil, however, speakers systematically and creatively utilize pointing tools in coordination with talk in order to locate, relate, characterize and illustrate objects in a digital space visible on a monitor (Spagnolli et al., 2005) or items in PowerPoint slides in presentations (Knoblauch, 2008). In addition to establishing a shared referent, pointing in digital space has been found to give salience to objects on screen and make relevant second pair parts (Sokol, 2021).

A growing number of studies demonstrate that pointing practices constitute an interactive resource beyond mere reference (Mondada, 2007, 2014a, 2016; see also Hindmarsh and Heath, 2000; Knoblauch, 2008; Frobenius, 2013). In work meetings involving documents and maps pointing may serve as a turn-organizational device, gaining its shape and interactional import in the specific ecology of action in which it is embedded (Mondada, 2007). Finely tuned with the progression of TCUs, pointing gestures are systematically used to project incipient speakership and for "organizing the emergent character of a 'transition space'" (Mondada, 2007, p. 194). Furthermore, and of particular relevance for our contribution here, by continuing to point past turn-completion, a participant can display rights and obligations that extend beyond their turn and speakership. As Mondada (2007) observes, this kind of activity is often linked to the organization of sequences, such as adjacency pairs, and marks the pointer's accountability as sequence initiator for its proper completion. Our analysis complements these findings by demonstrating how pointing practices – integrated with and adapted to the use of technological tools – contribute to the organization of technology-supported interaction. In our material, virtual pointing is mobilized not only to refer to on-screen objects and coordinate talk and on-screen conduct, but also to invite a response and to prepare for its possible implications, thereby advancing decision-making as a joint activity.

3. Data – remote follow-up meetings of an IT-Team

Our data comes from specific technology-mediated settings: distributed team meetings in an international IT-company. In these settings, the computer screen is the object of shared activity, and can be seen as the material and semiotic structure "without which the constitution of particular kinds of action being invoked through talk would be impossible" (Goodwin, 2000, p. 1489; see also Hindmarsh and Heath, 2000). The data can be described in terms of their intertwined properties of human-computer interaction on the one hand and technology-supported/-mediated interaction on the other. While it is only through the technology that these particular interactions become possible in the first place (which is a distinctive feature of technology-based communication), they are also characterized by co-participants' orientation to and work with that same

technological tool. In the meetings we show, only one of the participants is in control of the activity domain, i.e. one person uses the computer mouse (a so called input or interaction device, see Hinckley and Wigdor, 2012) to make choices that cause changes in the system. As the actions taken by this participant alter the system state, the changes are displayed on-screen and thereby visible to others (see also Arminen, 2005). What happens on-screen is the focal point of the participants' mutual attention.

The data involves one team, which operates in different locations in Finland and consists of multiple dispersed participants. The meetings revolve around a project management tool provided by the company's intranet, which displays, for example, requests to be dealt with as well as the status of ongoing customer projects. The main purpose of these weekly follow-up meetings is to review and jointly update this information in the intranet. However, only the chair[1] navigates the intranet and can make changes to these items. By selecting and clicking them with the help of the computer mouse, he or she can activate a pop-up or editing window that allows him or her to implement modifications in the system (e.g. to include additional information or add new tasks, update the status of a project, delete). The meetings follow a similar pattern as the attendants go through the items one by one in the order of their compilation. Via screen-share, participants have visual access to the intranet on their own computer screens, and they can follow the chairperson's on-screen activities (e.g. scrolling, mouse cursor movements, clicking, opening and closing windows, typing). At the same time, this is all they do see, as, by choice, they do not make use of their cameras and therefore have no access to each other's video images.

Our data set is part of a larger collection of recorded technology-supported meetings and consists of three consecutive weekly follow-up meetings that lasted between 23 and 29 min, amounting to a total of 1:20 h of recorded material. The recordings were automated (i.e., done via the participants' conferencing tool) and initiated by the chairs of each meeting. Thus, the videos represent the (shared) views of the respective chairs.

Pointing with the mouse cursor is prevalent in the recorded meetings and clearly fulfils a variety of functions. The analysis focuses on pointing actions produced in coordination with talk in a specific sequential environment: during the pre-monitoring phase when the participants turn their attention to and focus on a specific item to be updated prior to taking action on that item (i.e., before the decision to click or not to click a specific item). In this context, we identified altogether 12 instances, where the chair's mouse cursor movements occur in concert with a yes/no interrogative in such a way that they strongly project a response from a co-participant. We present 5 representative cases that illustrate how the mouse cursor is used to project specific next actions in the intranet and treat these actions as negotiable, i.e., requiring a complying or confirming response in order to be performed. The analysis shows how these mouse cursor movements are tied with other activities, together forming a finely tuned multimodal package (a “complex multimodal Gestalt”, Mondada, 2014a, p. 139) that sets up and reinforces conditional relevance and furthers the progressivity of the business at hand.

4. The pointer as an interactional resource

As components of the user interface, the standard function of the computer mouse is – by design – to enable users to interact with (i.e. to select, open, drag, or move) objects on the screen (see Hinckley and Wigdor, 2012). The input device is represented on the monitor by means of a cursor (or pointer), providing the user with feedback on its current on-screen location and making visible user manipulation of the tool. Furthermore, changing mouse pointer icons (e.g.) not only indicate the system state, but also display how certain objects can be interacted with (e.g. marking an object as a link that can be clicked; see Hinckley and Wigdor, 2012).

While, naturally, these default features are present in our data, the input device and in particular its representations on screen clearly fulfil additional, interactively relevant functions for co-participants as the participant in control manoeuvers through the intranet. In other words, the ways this tool comes into play here are not necessarily limited to and do not always match its preset technological affordances. In the following section (4.1), we demonstrate how different pointer movements such as directing the cursor from one item to another and clicking accomplish different actions in concert with verbal conduct. We further show how tracing a link or holding the cursor in place (i.e., not clicking) serve distinct purposes in the pre-monitoring phase of action (Arminen, 2005), and afford a view of the chair's focus, making available the referents of ongoing talk. The first example, thus, serves as the backdrop for the main analysis, which demonstrates how the pointer is utilized as an interactive resource in joint decision-making (4.2) and in negotiating a request (4.3). Sections 4.2 and 4.3 illustrate how cursor pointing is used to visibly prepare for next (on-screen) actions and invite a (complying) response before proceeding.

[1] The task of chairing these weekly meetings is rotated among the participants.

4.1. Establishing focus and projecting 'clickable' items

The first extract (Figs. 1–5) illustrates how different uses of the mouse cursor feature in the preparation and accomplishment of an activity shift, marking a transition from the chair's silent decision-making process to selecting a new topic. The pointer is utilized here to draw the participants' attention to a new domain of scrutiny (Hindmarsh and Heath, 2000; Goodwin, 2007) and project next focal points, while establishing reference. In the trajectory of this instance, clickable items are treated differently by the chair. Clicking and not clicking ('pointing' at) links in the intranet not only foreshadow and account for the chair's activities, but also display an orientation to the participants asymmetrical rights to take action, i.e. their deontic authority (Stevanovic and Peräkylä, 2012).

The example comes from a passage focusing on a to-do list towards the end of a remote meeting chaired by Roosa.[2] The activity involves picking relevant items (and sub-items) on the list to discuss and – if necessary – edit. The excerpt begins with Roosa's announcement that references the '*to-do list*' ('tehtävälista', Fig. 1, line 1). Concurrently, through her on-screen activities she displays an orientation to the first item on that list: at first, the mouse cursor is placed right underneath the headline ("Tehtävälista", Fig. 1a). However, while producing the word, she moves the pointer downward to "*1. Not started*" ("1. Ei aloitettu") and clicks (Fig. 1b):[3]

Excerpt 1 (intra meeting P2/21:37–21:49) (roosa (chair), iida)

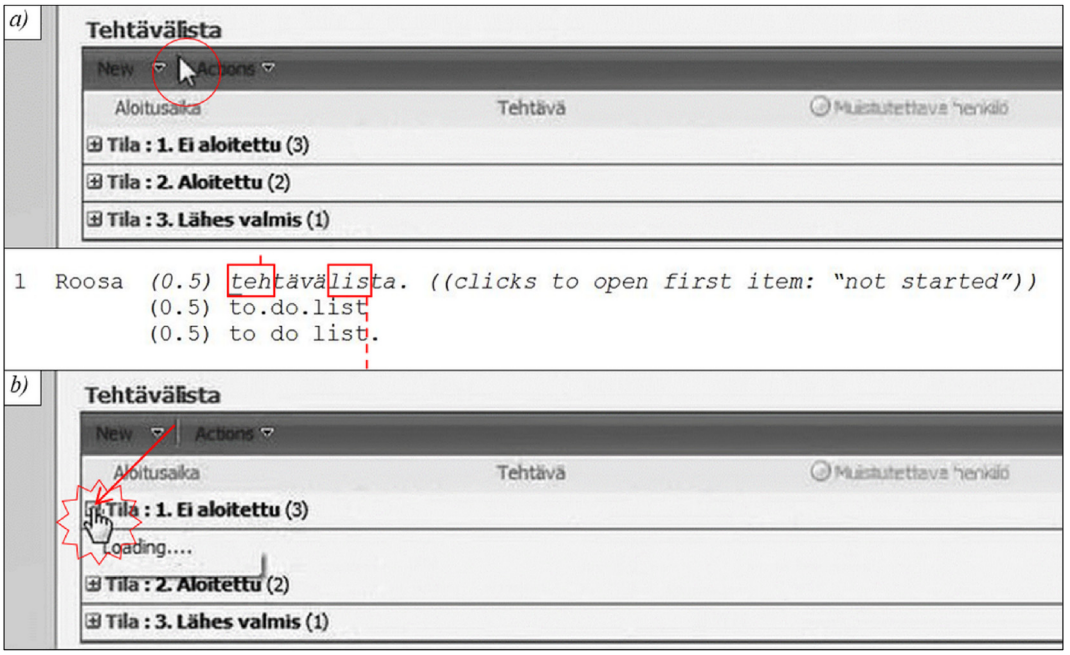
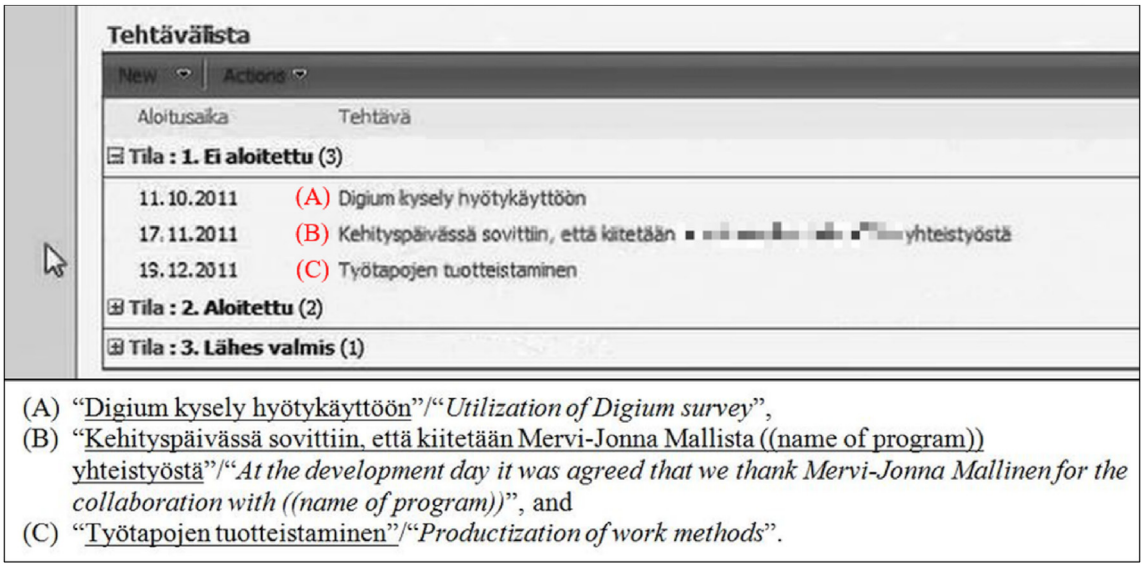


Fig. 1.

In face-to-face interaction gestures can often be seen to work also as prefaces, which "allow other participants a certain premonition as to what this actor might be up to next" (Streeck, 1995, p. 87; see also Schegloff, 1984; Streeck and Jordan, 2009). Similarly, here the movement of the mouse cursor foreshadows how the chair is likely to proceed: it brings the imminent first focus within the framework of the to-do list into play. In other words, Roosa visibly prepares for and displays attention to the next item the work group should concentrate on and possibly edit. Her prompt, even proactive selecting and clicking of the "*Not started*" item progresses the activity and indexes the chair's deontic authority (Stevanovic and Peräkylä, 2012): it marks the link as something she as the chair can interact with without explicitly involving the group. Indeed, the silence of her co-participants ratifies Roosa's choice.

[2] All names have been changed to ensure anonymity.
[3] The English gloss complies with the glossing principles proposed by Sorjonen (2001).

Roosa's action opens a sub-list of three tasks, which – at least according to their currently marked status – have not been started yet. All three entries work as links, which upon clicking would open an edit window. Throughout the following analysis, we will refer to these links using (A), (B), and (C) as indicated below (Fig. 2):



(A) "Digium kysely hyötykäyttöön"/"*Utilization of Digium survey*",
(B) "Kehityspäivässä sovittiin, että kiitetään Mervi-Jonna Mallista ((name of program)) yhteistyöstä"/"*At the development day it was agreed that we thank Mervi-Jonna Mallinen for the collaboration with ((name of program))*", and
(C) "Työtapojen tuotteistaminen"/"*Productization of work methods*".

Fig. 2. Opened sub-list of items that have not been started.

Roosa's subsequent activities all center on these three points (Figs. 3–5, lines 3–5, Excerpt 2, Figs. 6 and 7, lines 6–11). As she leads the group through these items to be dealt with, her on-screen conduct makes visible a decision-making process (choosing the item to be discussed next). This begins with consideration of the different options (Figs. 3–5) and further evolves into a joint activity when she invites her co-participants to respond (see Section 4.2, Excerpt 2, Figs. 6 and 7).

In detail, Roosa's actions unfold as follows. She scrolls down (Fig. 3, line 2), bringing the entire to-do list back into view after parts of it moved out of sight due to her earlier opening the "*Not started*"-subcategory (Fig. 2). This is followed by a pause of 2.0 s, during which she moves the pointer first to the right and then slightly to the left (Fig. 3a). There it comes to a halt – right on top of the first link (A). About half a second later, Roosa quietly voices the word 'digium' for several times (line 3), identifying the first link while holding the mouse cursor in place (Fig. 3b):

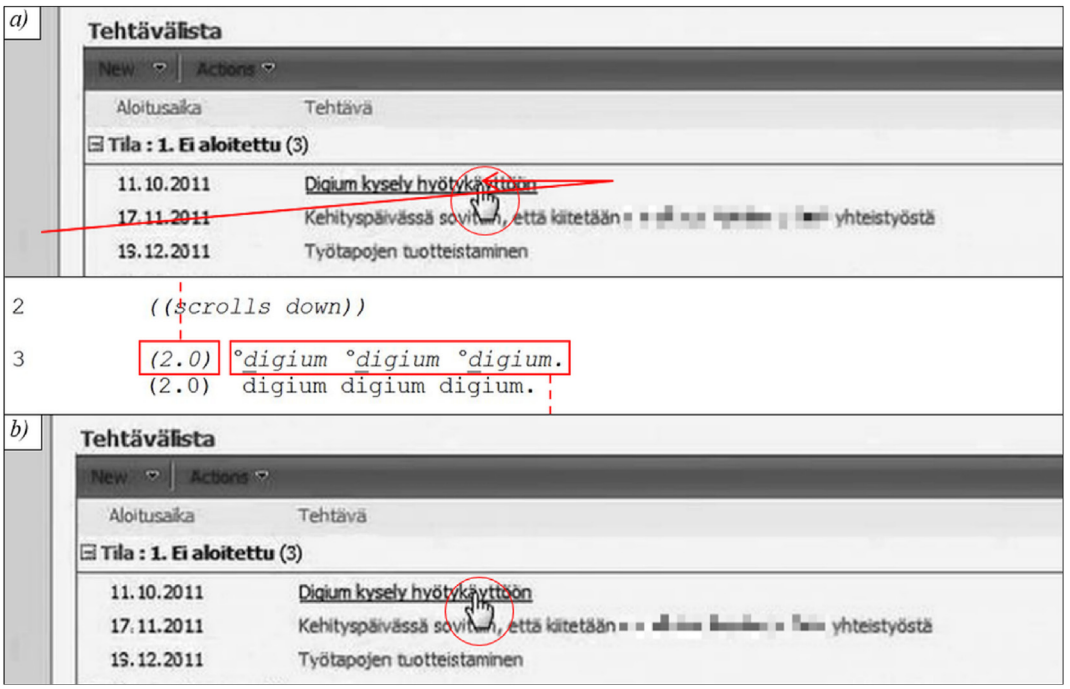


Fig. 3.

The movement of the pointer indicates what Roosa is starting to focus on under the currently opened subcategory ("*Not started*") and draws attention to the next possible field of action (A). After uttering 'digium digium digium', however, Roosa pauses and then continues with the third item on the list, beginning to whisper '*productization of work methods*' (Fig. 4, line 4). At the same time, she takes the mouse cursor down to the corresponding link (C) (Fig. 4a). By proceeding to another option on the sub-list, Roosa leaves the first entry as something that might not require the group's immediate action:

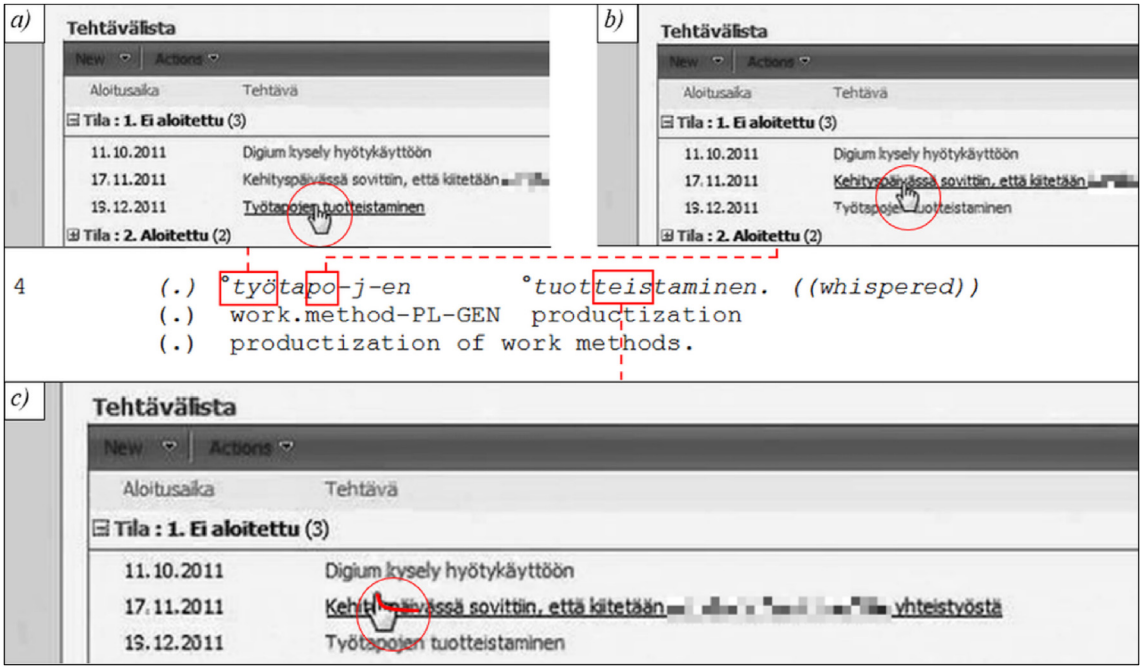


Fig. 4.

However, Roosa almost instantly moves away from the third item, while she continues to whisper. Consequently, when her '*productization of work methods*' at line 4 comes to a conclusion the cursor has long left the respective link (C). By not clicking, but rather moving the pointer quickly up to the second task (B) (Fig. 4b), she thus makes available to her colleagues that she is not staying to deal with this subject.

Using the pointer in this way whilst attending to the items on the screen, reading them aloud in quiet voice, Roosa makes witnessable to her co-participants not only what she is looking at but also what she is doing, namely figuring out what these ("not started") items are about and which one should be discussed next. Her actions do not make relevant verbal participation from the others, which the others orient to by remaining silent (see Stivers and Rossano, 2010; Keevallik, 2018). The vital role of the pointer in this public display of her decision-making process becomes even more evident during the now evolving pause of almost 4 s and in light of her verbal activity after that (Fig. 5a and b, line 5):

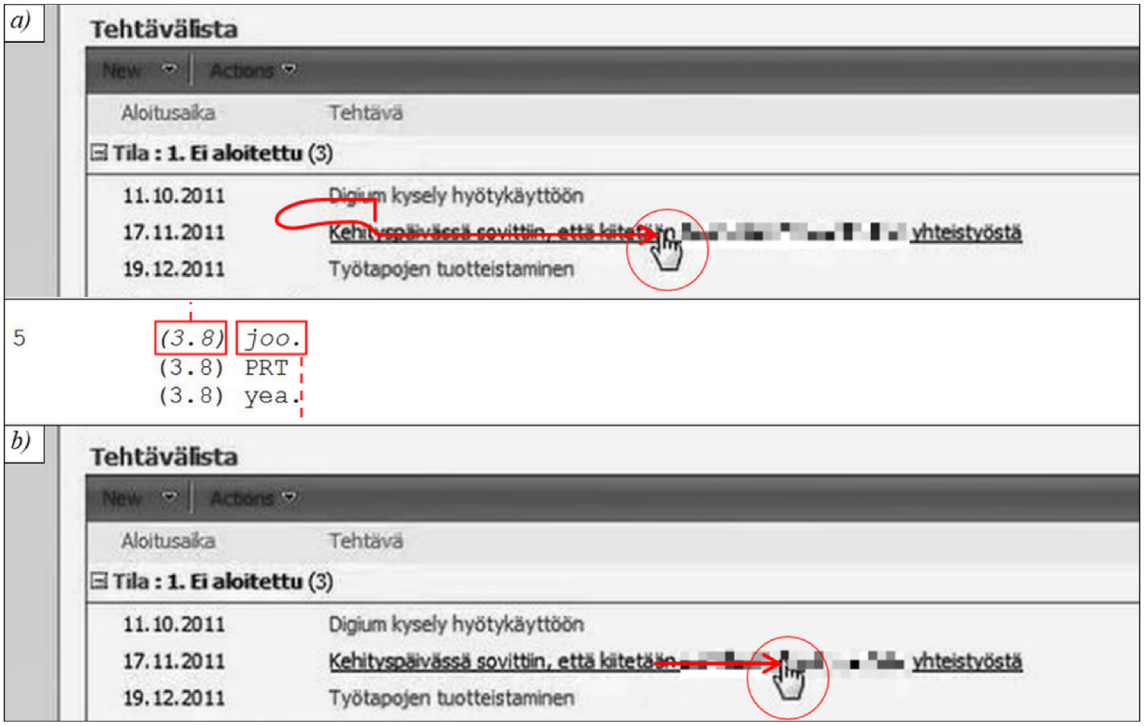


Fig. 5.

Because the participants cannot see each other in these meetings, through her on-screen conduct Roosa can affirm her activity and even her presence while being quiet for a longer period of time: silently, Roosa steers the pointer back up to "digium" (A), from there to the left and then back downward to the second item (B). Still without talking, she then takes the mouse cursor to the right, tracing the sentence in the link. When it reaches the key verb "*thank*", the pointer stops and stays still for a few seconds (Fig. 5a). Roosa next utters a response token, '*yea*', during which she takes the mouse cursor further to the right (still on top of the same link) to the surname where it again stands still momentarily (Fig. 5b, line 5).

This passage constitutes a junction in several respects. Not only does Roosa's '*yea*' – produced with falling intonation contour – mark the end of her public thinking, also the shift in her mouse cursor movements from 'browsing' to more focused tracing, indicates that she has picked out the next relevant issue. However, what she has chosen, namely the entry dealing with the task of thanking a colleague for some past collaboration, is evident solely in the light of her on-screen activities. It is the movement of the pointer here that provides the only hint to what Roosa's '*yea*' in fact relates to. Considering the placement of '*yea*' in relation to her visible conduct, we can also see that '*yea*' indexes the crucial meaningful action for the work group to talk about ('thanking').

Roosa thus has chosen a task, which opens a new sequence. The pivotal role of this passage becomes visible in Roosa's next action, formulating a question and inviting her co-participants to engage in the decision-making process (Excerpt 2, below). This involves specific uses of the pointer in coordination with verbal turns to solicit a response. The following section illustrates how the pointer is mobilized as some next action becomes interactively relevant. The analysis focuses on the use of the pointer to mobilize a response in order to negotiate a joint decision.

4.2. Mobilizing a response for joint decision-making

Stivers and Rossano (2010) have argued that different types of resources – interrogative syntax, interrogative prosody, gaze and epistemic primacy – contribute to holding the recipient accountable for responding and that the inclusion of multiple resources incrementally increases response relevance. In our data some forms of mouse cursor pointing contribute to making a response relevant (see also Sokol, 2021). This type of pointing includes hovering or fixing the cursor on a selected item on the screen, and it is finely coordinated with verbal utterances that invite or pursue a response from other participants. Pointing practices in these occasions work as a resource in mobilizing a response by doing "preparation work" (Dausendschön-Gay and Krafft, 2009, p. 265) and treat the next relevant on-screen actions as negotiable, to be agreed upon prior to enacting the decision in the system.

Excerpt 2 (Figs. 6 and 7) from the same passage as the excerpts above (the 'to-do list') shows how the use of the pointer in coordination with speech displays a change in Roosa's orientation to the decision-making activity. After picking out the next relevant item to discuss ('thanking', see Fig. 5 above), Roosa formulates a yes/no question (lines 6–7) holding the pointer on top of the link.

Excerpt 2 (intra meeting P2/21:49–22:13) (roosa (chair), iida)

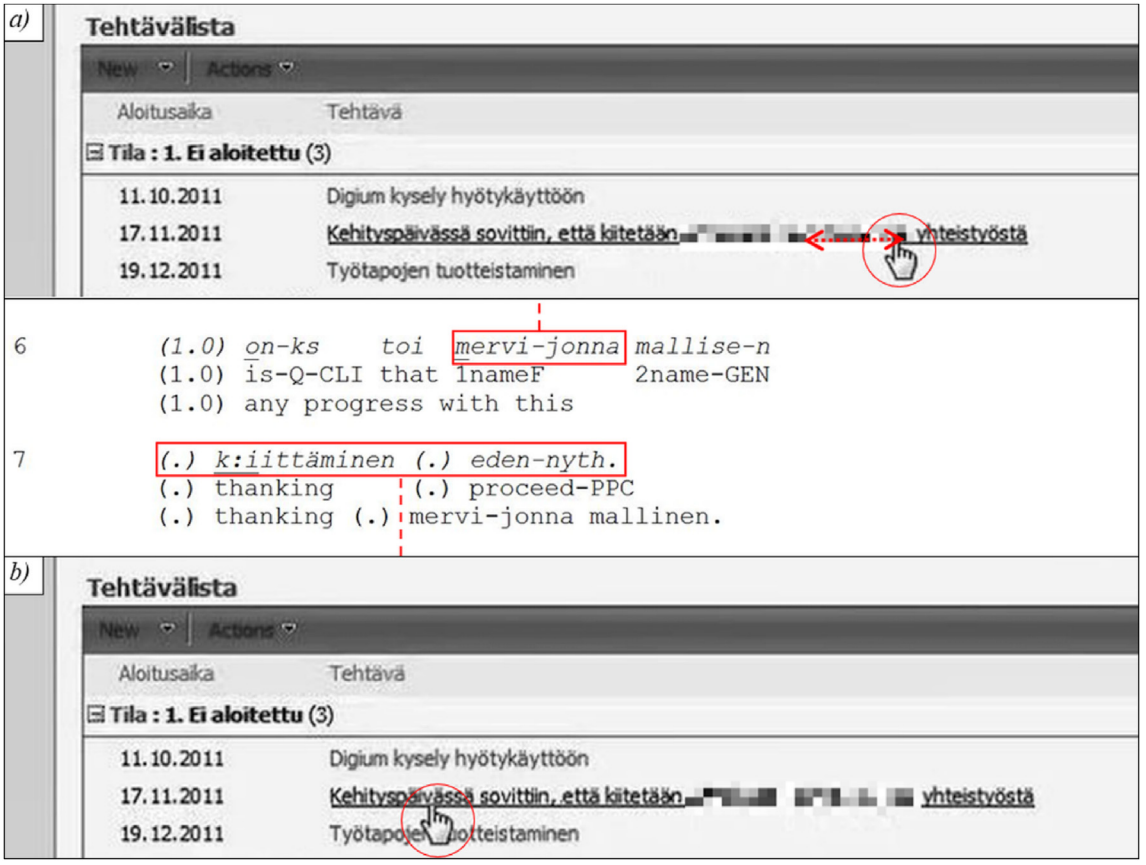


Fig. 6.

In contrast to the earlier movements of the cursor during the moments of selecting the next topic, the pointer is now placed on top of the link (B), moving only horizontally until it eventually comes to a halt when Roosa's question ('*any progress with this thanking (.) mervi-jonna mallinen.*') reaches possible completion at line 7 (Fig. 6b). Roosa thus not only

continues to highlight referents of her talk, indexing the subject of her inquiry and in particular the name of the person in question (Fig. 6a, line 6), but by ceasing to move the mouse cursor in coordination with the end of the question, she also visibly awaits an answer while maintaining the focus on the respective task (B). Indeed, the mouse cursor remains nearly unaltered in place (on top of the word "Kehityspäivässä"/"*At the development day*") when Roosa pursues a response by expanding her turn and explicitly selecting Iida next (Fig. 7, lines 9 and 11), after none of her colleagues reacts:

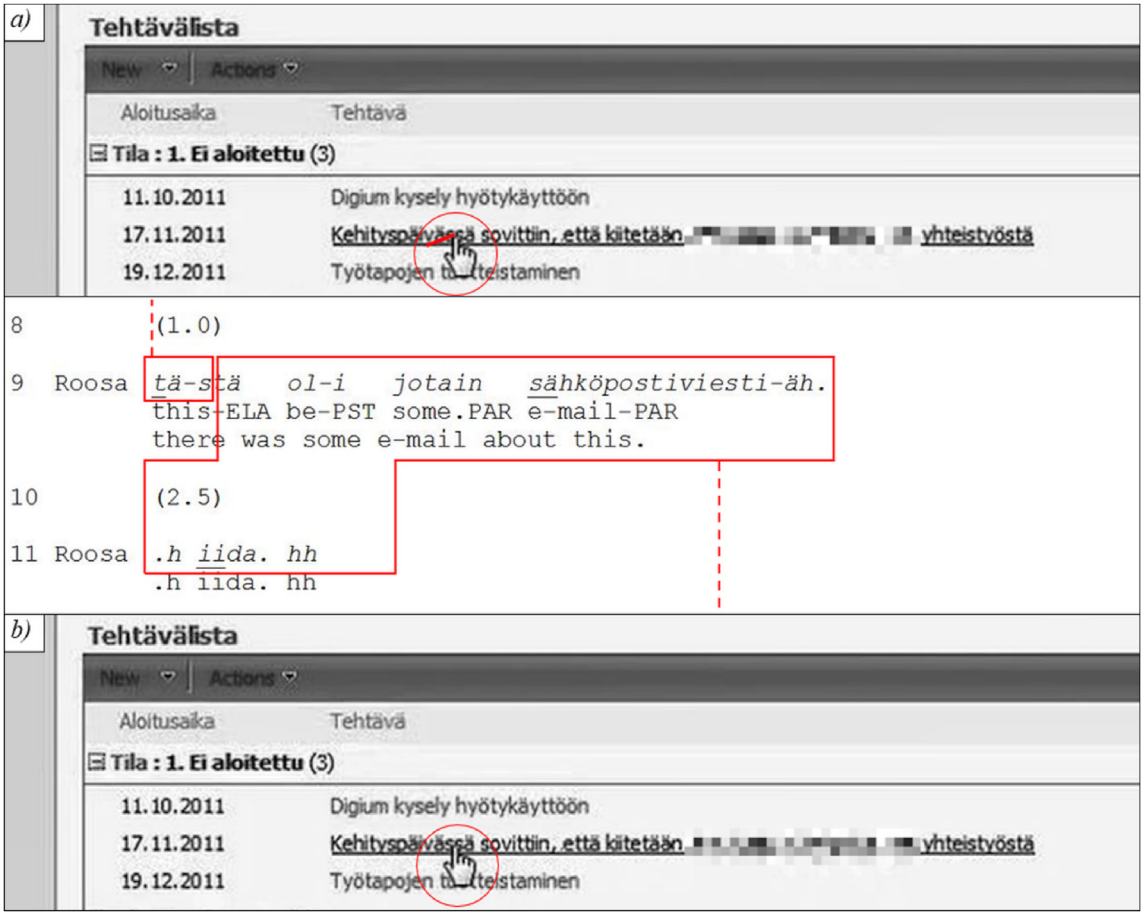


Fig. 7.

Thus, through the mobilization of finely tuned multimodal resources Roosa clearly builds up the expectation for a response, orienting to the implications of others' insights in the matter. She indicates the ongoing relevance of her question by continuing to point at the link (B) past turn-completion (Fig. 7b, line 11) and for the duration of the lengthy response produced by two of her colleagues (not shown). Sustained pointing at the link thus performs a similar function as a gesture hold has been found to do in face-to-face interaction (see e.g. Kendon, 1995; Sikveland and Ogden, 2012). By maintaining visible reference to the task at hand, Roosa orients to her role as initiator of the question-answer sequence and displays

responsibility for the sequence, observably overseeing its course (Mondada, 2007). Subsequently to the response, Roosa produces a short acknowledgement and removes the pointer from the link, thereby marking receipt, and ending the sequence.

The next example comes from another meeting of the work group, where the task of chairing has been taken on by Henna. The excerpt starts with Henna drawing attention to a next item, '*successes*'. As can be seen in Fig. 8 below, she initiates the new topic not only verbally ('*.hh then successes,*') and prosodically through a level intonation contour, but also by moving the mouse cursor towards the section in question (Fig. 8a, line 1):

Excerpt 3 (intra meeting P1/17:06–17:23) (henna (chair), olli)

Fig. 8.

After Henna has introduced the topic, she continues by enquiring whether anyone has been successful (line 2). At the same time (during '*succeeded*'), she shifts the mouse cursor to the left and up, towards two commands that enable editing and adding entries ("New" and "Created", Fig. 8b), thereby orienting to making changes to the system. She is doing preparation work by bringing the pointer into position, displaying readiness to engage with the nearby items on screen. Thus, together with the design of her turn-constructional unit, the yes/no interrogative at line 2, her screen-based activities set up an expectation for a positive response entailing a status update. Next Henna quickly expands her turn, indicating some problem with her question but also reinforcing the established expectation: "*(.) or everyone has succeeded, (2.0) in some things,*" (Fig. 9, lines 3–4). At the same time, she keeps the pointer hovering over "Created" (Fig. 9a), thereby maintaining the current focus as well as continuing to project upcoming changes:

At line 5, Olli self-selects in response to Henna's question. In his turn, he provides a short description of what he has accomplished, and accounts for it as a story of success that could be included here (Figs. 9 and 10, lines 5–8). In the course of his contribution, Henna moves the mouse cursor up to "New" and clicks the command to open an editing pop-up. These on-screen activities are finely tuned with Olli's talk, treating it as relevant for proceeding with the task and visibly aligning to the status update as a joint project: she directs the pointer to the relevant item precisely when his turn-constructional unit at

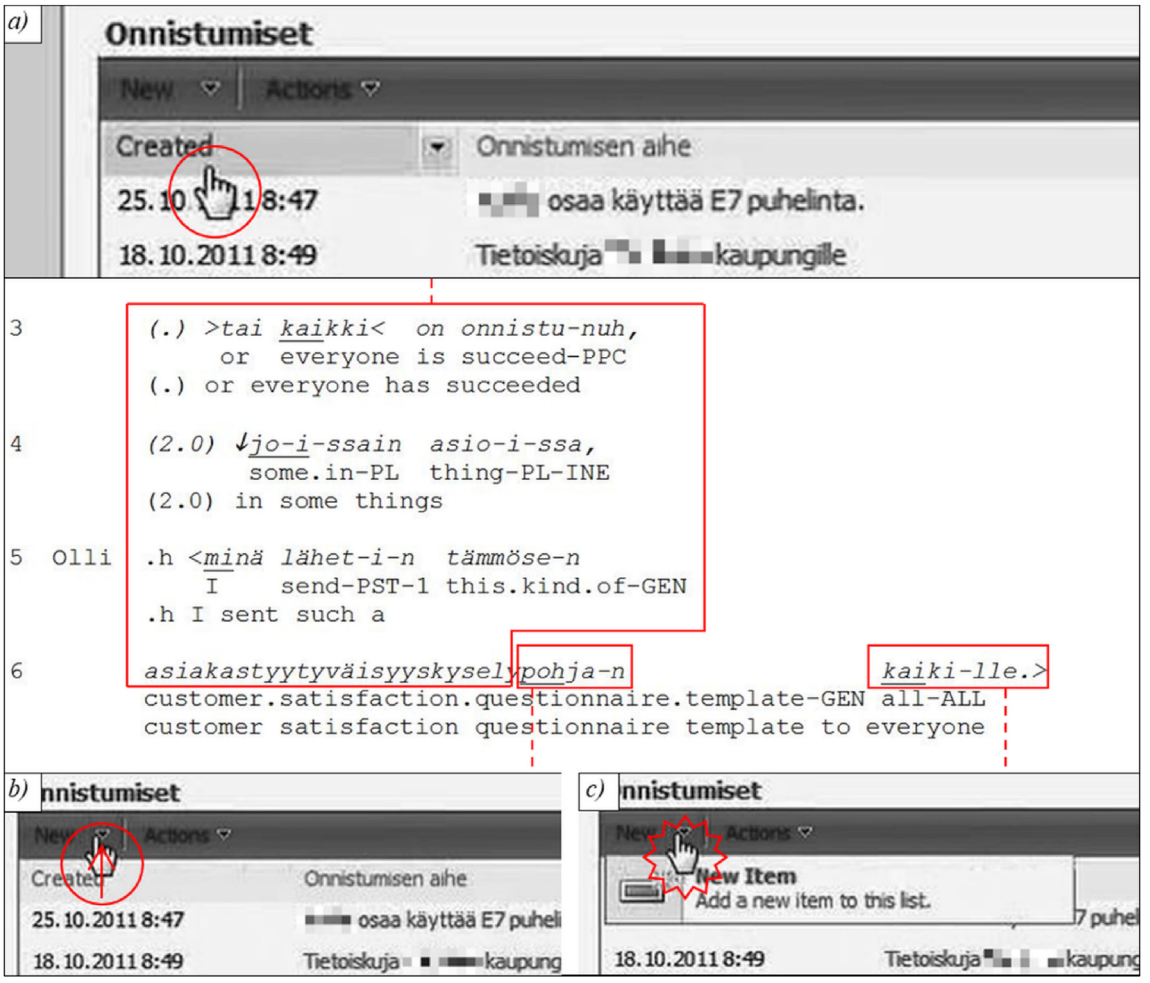

a)
Onnistumiset
New
Actions
Created
Onnistumisen aihe
25.10.2011 8:47
osaa käyttää E7 puhelinta.
18.10.2011 8:49
Tietoiskuja kaupungille
3 (.) >tai kaikki< on onnistu-nuh,
or everyone is succeed-PPC
(.) or everyone has succeeded
4 (2.0) ↓jo-i-ssain asio-i-ssa,
some.in-PL thing-PL-INE
(2.0) in some things
5 Olli .h <minä lähet-i-n tämmöse-n
I send-PST-1 this.kind.of-GEN
.h I sent such a
6 asiakastyytyväisyyskyselypohja-n kaiki-lle.>
customer.satisfaction.questionnaire.template-GEN all-ALL
customer satisfaction questionnaire template to everyone
b)
nnistumiset
Created
Onnistumisen aihe
25.10.2011 8:47
osaa käyttää E7 puheli
18.10.2011 8:49
Tietoiskuja kaupung
c)
nnistumiset
New Item
Add a new item to this list.
18.10.2011 8:49
Tietoiskuja kaupung

Fig. 9.

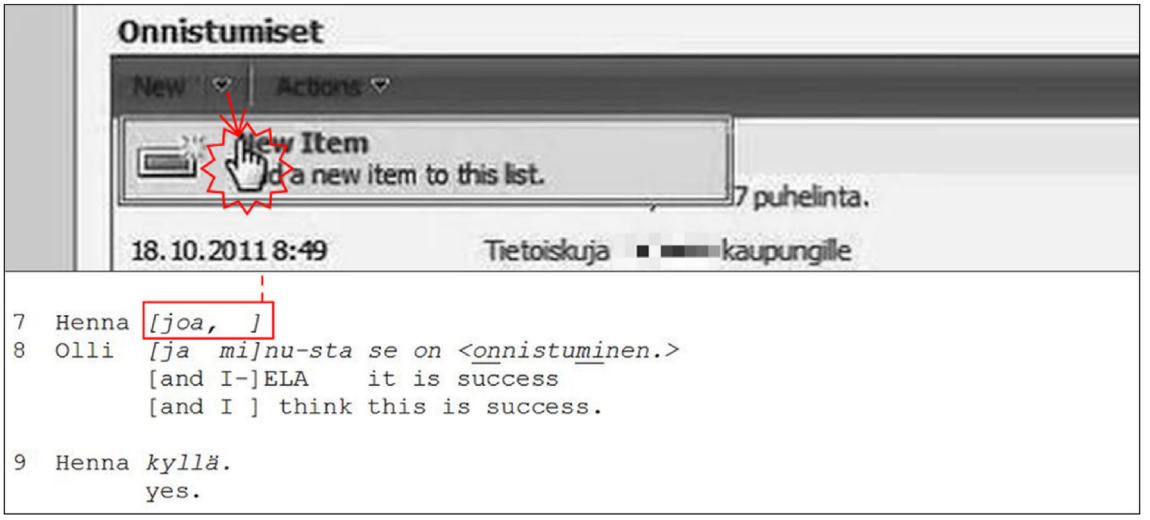

Onnistumiset
New
Actions
New Item
a new item to this list.
7 puhelinta.
18.10.2011 8:49
Tietoiskuja kaupungille
7 Henna [joa,]
8 Olli [ja mi]nu-sta se on <onnistuminen.>
[and I-]ELA it is success
[and I] think this is success.
9 Henna kyllä.
yes.

Fig. 10.

lines 5 and 6 reaches possible completion (Fig. 9b), and she begins to interact with it when his turn is possibly complete (Figs. 9c and 10). In this way, Henna not only ratifies Olli's suggestion (also verbally at lines 7 and 9, Fig. 10), but she also displays an orientation to the mutual advancement of the ongoing task.

During the whole of this passage, Henna's mouse cursor movements, in coordination with ongoing talk, locate referents of current as well as projected actions on screen, embedding preparation work. Through these pointing activities, Henna not only directs and maintains the focus on different aspects of the present task. She also observably displays orientation to progressivity, which, together with interrogative syntax and prosody, serves to mobilize a response that complies with the sequential implications of the question. Holding the cursor in place and not clicking the item until Olli's response becomes clear shows that before proceeding to taking action, another action needs to be completed. The choice of clicking the link depends on the response and its relevance to the task at hand. Henna thus orients to editing as a joint activity that involves negotiation of the projected action of clicking.

Henna adapts the tool's functionality for interactional purposes until its intended use (selecting and clicking items on screen) becomes relevant. This extract thus illustrates how virtual pointing practices are deeply entrenched with the job at hand and how they are subtly integrated with other activities together building up an expectation for a sequentially consequential response.

In the following excerpt the complex and situated achievement of conditional relevance becomes even more evident. Again, mouse cursor movements observably serve as a response-mobilizing resource: through on-screen preparation work, intertwined with locating referents and indicating loci and nature of possible action, the person in control of the mouse projects (and thereby increases expectation of) an aligning response that would allow her to perform an update in the system. Whereas in the previous example the format of the chair's question (Fig. 8, line 2) encouraged self-selection, now the next speaker is determined through "the 'last as next' turn-order bias" (Sacks et al., 1974, pp. 728–729), which is a mechanism intrinsic to the local, turn-by-turn accomplishment of mutual understanding.

The chair, Paula, and Olli are dealing with a task that includes giving out new instructions on marking working hours in the system (under "*job performance*"). The assignment is listed in the intranet as "not started" (Fig. 11), and Paula as the chair has the means to change its status (e.g. to "started" or "completed") or to add comments. Prior to this passage, Paula asks Olli if some guidelines sent out by him days earlier, are in fact related to this item, to which Olli answers in the affirmative. The segment begins with Paula's receipt (Fig. 11, line 1):

Excerpt 4 (intra meeting P3/7:25–7:33) (paula (chair), olli)

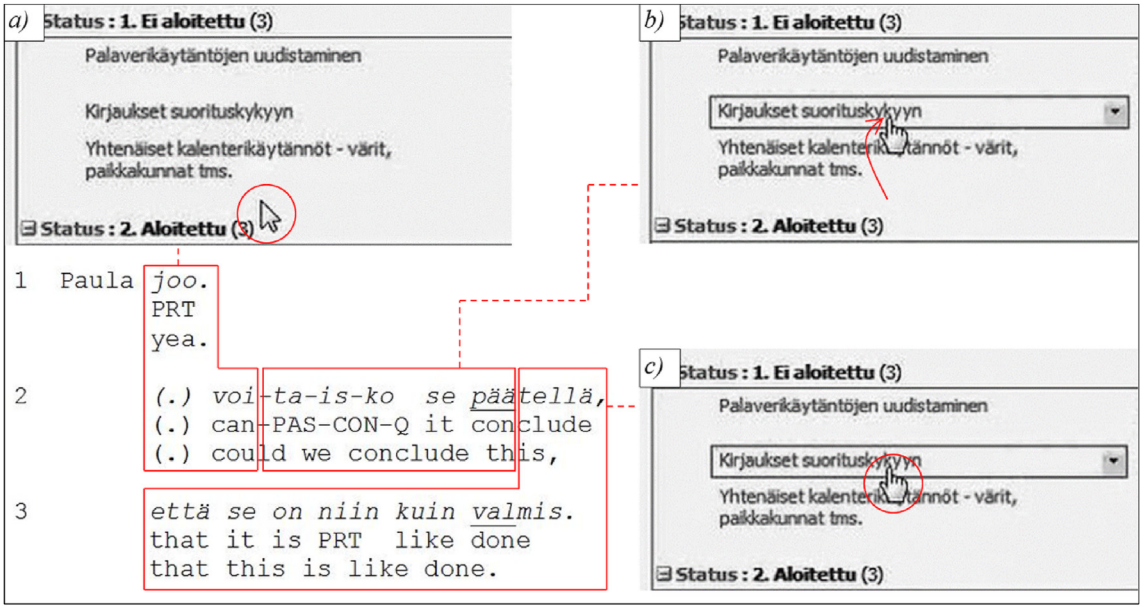


Fig. 11.

Our focus here is particularly on the subsequent lines, where Paula brings the mouse cursor into play while mobilizing another response from Olli. After her receipt at line 1, Paula continues with a new question proposing to change the status of the task, namely to mark it as completed (lines 2–3). So far, the pointer has remained still at the bottom of the list of tasks that (according to their current status) have not yet been attended to (Fig. 11a). However, while Paula utters '*could we conclude*' at line 2, she now also visually directs the attention to the on-screen item in question by moving the mouse cursor upward to point at "Kirjaukset suorituskykyyn" ("*Entries into job performance*", Fig. 11b), where she then keeps it hovering until her question reaches possible completion (Fig. 11c).

Coupled with the interrogative turn design at lines 2–3, Paula's on-screen activities foreshadow further employment of the mouse. The question clearly invites a positive response, and as such, it projects some next possible action (i.e. to mark the task referred to as completed) – an action that requires manipulation of the input device in order to carry out the necessary adjustments in the system. Shifting the pointer up to the item, closer to where its status can be updated, indicates that Paula is starting to prepare for the implications of a possible affirmation. In this way, the mouse cursor movements add to mobilizing a response and setting up an expectation favoring a 'yes'. This becomes even more evident during the following pause (Fig. 12, line 4): Paula shifts the cursor to the right to point at the item's edit icon (as indicated by the appearance of the word "Edit", a so-called 'tooltip' with which the system reacts to the cursor hovering over the drop-down symbol to provide information on its properties, Fig. 12a). She is now clearly displaying an orientation to clicking and editing as possible nexts:

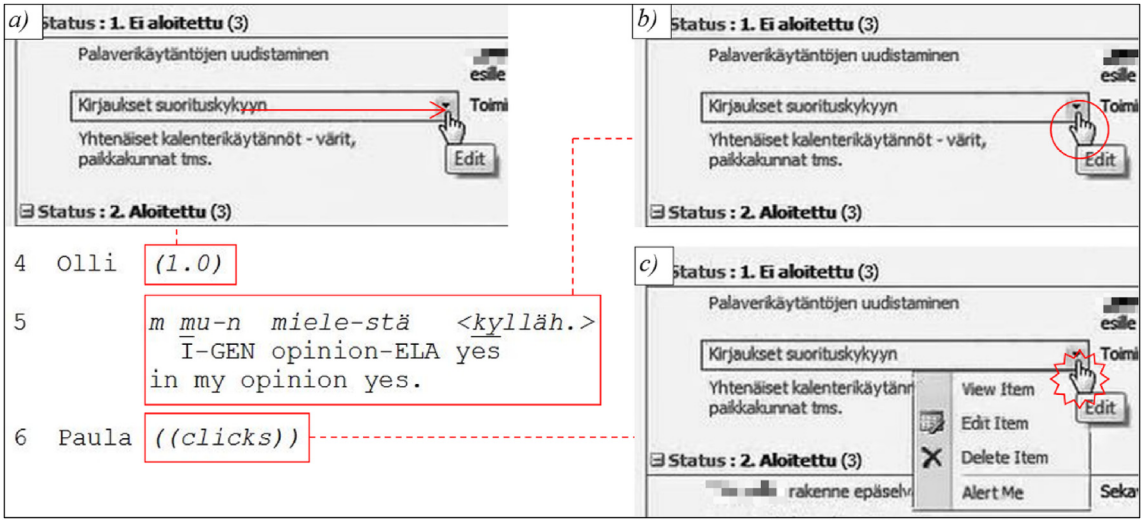


Fig. 12.

As can be seen in the trajectory of Fig. 12, Paula continues to point at the drop-down symbol/"Edit" with the mouse cursor and holds it in that position throughout Olli's reply at line 5. Indeed, she clicks the icon only when the essence of his answer becomes clear. By keeping the pointer on "Edit", Paula – in addition to further reinforcing expectation of a positive response – sustains the focus of their current activities while visibly preparing for and awaiting Olli's confirmation.

During another short exchange between Paula and Olli later, this pattern of inviting a response recurs in an almost identical manner. Also here, Paula's mouse cursor movements fulfil referential functions and contain witnessable orientation to progressivity. Like before, these on-screen activities contribute to building and reinforcing conditional relevance and to conveying preference for affirmation. The extract begins in the middle of an extended turn by Olli. Prior to this, Paula asks what the first item on the opened "*to-do list*" is about ("*Utilization of Digium survey*"; see also example 1) and selects Olli as the next speaker by enquiring whether he knows anything about this task. In response to Paula's questions Olli provides some information implying that the software is already in use across different units of the company and here, in line 1 (Fig. 13), he explains that these units have bought their own licenses. So far, the pointer has remained still below the list of (not started) tasks (Fig. 13a). As Olli continues by adding how many licenses have been acquired in the course of the year, more precisely while he produces '*almost ten*', Paula moves the mouse cursor up to point at the item in question (lines 2–3, Fig. 13b):

Excerpt 5 (intra meeting P3/22:02–22:22) (paula (chair), olli)

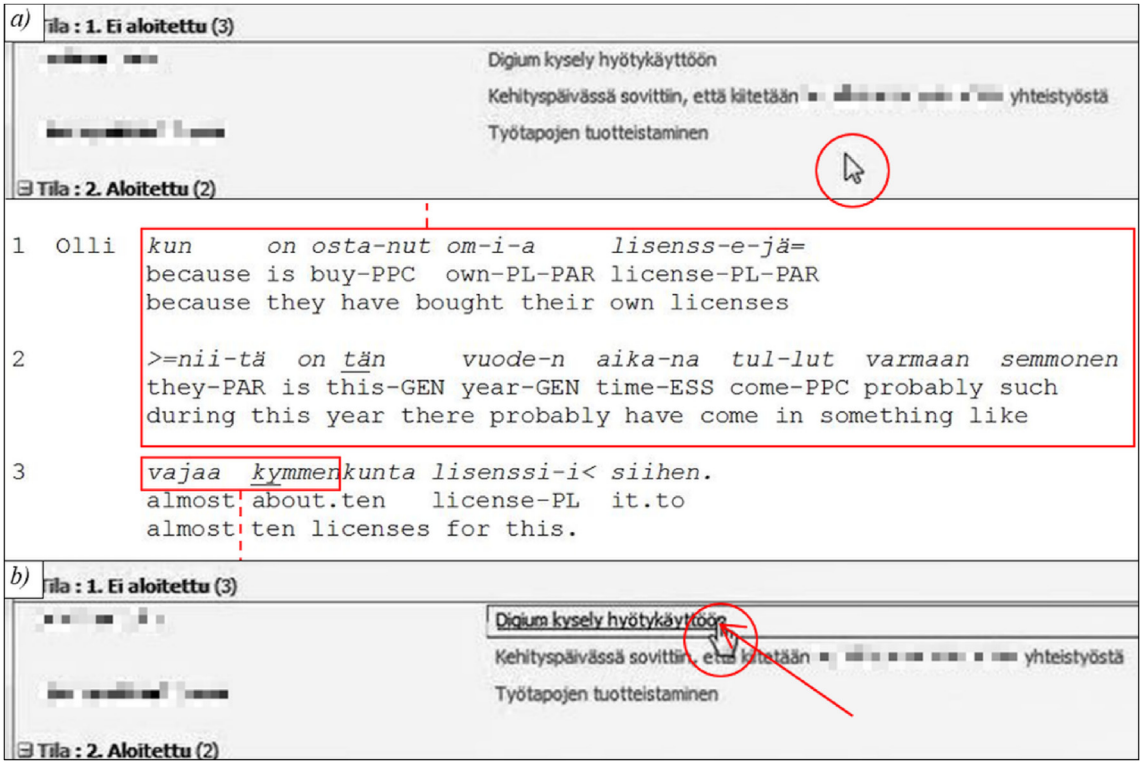


Fig. 13.

In this way, the current focus is highlighted in the intranet, helping to maintain joint attention: Paula's on-screen activity clearly indexes the referent of ongoing talk. However, the timing of her move has further implications. When she shifts the cursor upward to the task the upshot of Olli's talk is starting to become clear and his ongoing turn-constructional unit is nearing possible completion. Paula thus visibly projects and prepares for some next action, treating Olli's clarification as sufficient, but also as possibly leading to a status-update. This is emphasized by a 'mouseover', i.e., a change in the appearance of an item, which is triggered by the mouse cursor hovering over it, indicating that and how the item can be interacted with: As the pointer reaches "*Utilization of Digium survey*", the task takes on the form of a link in a drop-down bar bringing out the option of acting on it and making changes (Fig. 13b). However, Paula does not click the link, but she keeps the pointer in this position while Olli further expands his turn (Fig. 14, lines 4–5):

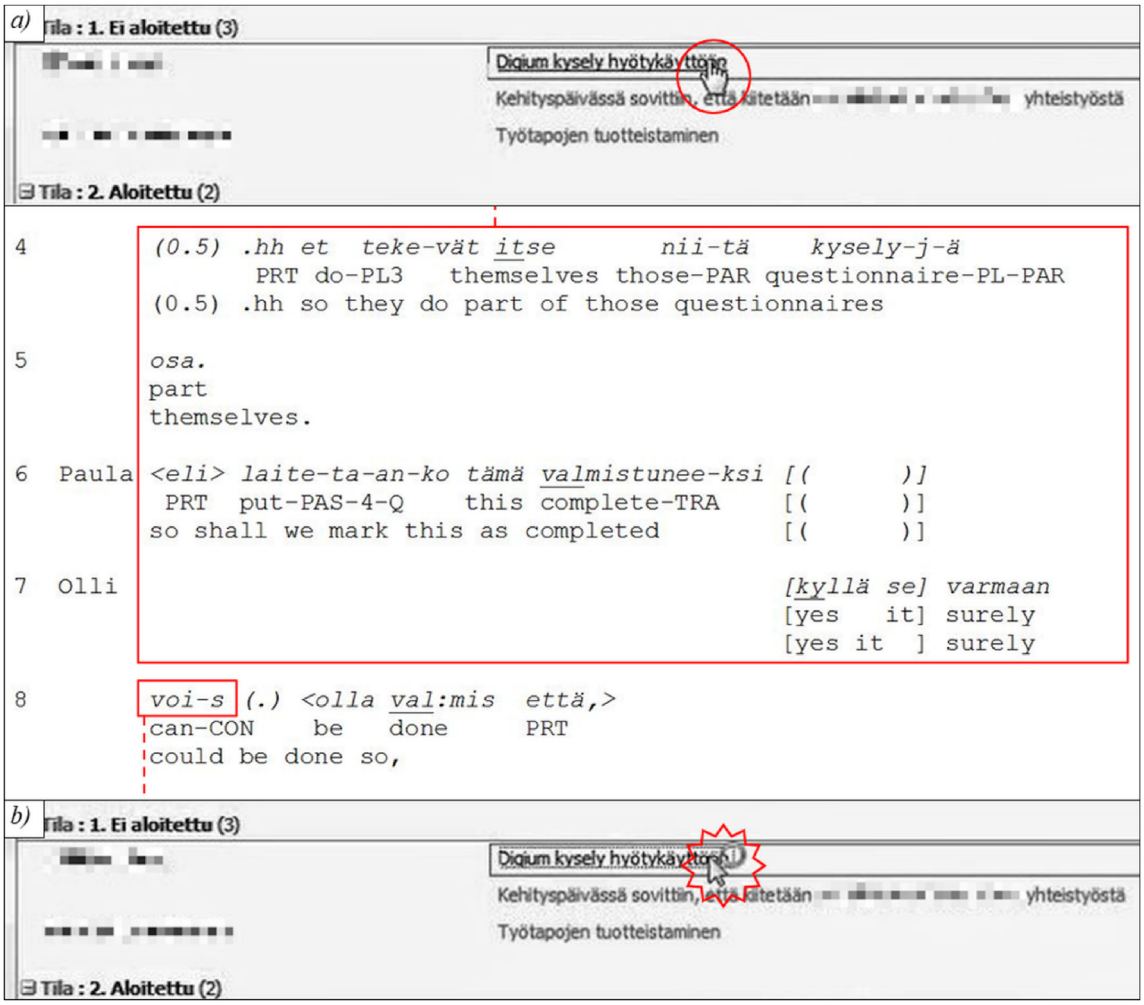


Fig. 14.

So while she grants him another turn-constructional unit, the imminent end of Olli's talk – as well as possible next (i.e. editing) – remains on the table, so to speak. Paula observably keeps on orienting ahead (Fig. 14a). Following Olli's addition, Paula self-selects, treating his turn as possibly complete. Although she does not change the position of the mouse cursor, in combination with her question at line 6 ('*so shall we mark this as completed*'), it now clearly conveys Paula's readiness to act upon an affirmation. In fact, at this point it becomes clear that by directing the pointer to the item and holding it in place (Fig. 13b), foreshadowing engagement with the link, Paula has been preparing for her turn at line 6 and for marking the task as completed long before even asking the question. By waiting for an affirmative response and not clicking Paula treats the decision concerning the task as needing confirmation from Olli. Thus, again her on-screen activities not only facilitate mutual orientation (note, for example, how Paula's use of the indexical '*this*' can rely on the cursor for deictic reference), but they also observably work towards progressivity. Holding the cursor in place contributes to inviting a response and to establishing strong expectation of a confirmation, which is required for the chair to carry out the relevant changes. In other words, Paula does not claim the right to decide on the next action, but treats it as shared with Olli (see Stevanovic and Peräkylä, 2012). Upon Olli's confirmation (lines 7–8), Paula clicks the item to open an editing window (Fig. 14b), and eventually she updates the status of the task to "completed".

In sum, similar to the preceding examples, also in these two fragments the mouse cursor is observably utilized beyond its default function. As the analysis shows, the chair mobilizes the pointer well before clicking and thus well before its use as input device becomes relevant. Paula's on-screen activities, including the different uses of the pointer are finely coordinated with ongoing talk. This is not only apparent with regard to the onset of her mouse cursor movements (Figs. 11b and 13b), or in view of her directing the pointer to "Edit" during Olli's pause at line 4 in Excerpt 4 (Fig. 12a), but also and especially with respect to the well-timed shift from non-default to default utilization of the device (i.e. the switch from pointing and waiting to clicking; see also Mondada, 2014a, on the timely switch between different uses of a surgical tool) (Figs. 12c and 14b).

The entire ensemble of yes/no interrogative and moving the cursor towards the focal item (as well as pointing at "Edit" in Excerpt 4) works as a package in mobilizing a response, building strong constraints in favor of an affirmation by visibly

preparing for an action that depends on a 'yes'. Through these synchronized activities Paula projects continuation and thus displays an orientation to the talk's progressivity. Preparing to activate the edit-window enables her to click on it without delay, thereby minimizing possible gap between the (anticipated) confirmation and next action. At the same time, the use of the pointer, specifically holding it in place on the relevant link beyond turn completion and well into the response in progress (until the gist of the answer becomes clear), shows orientation to shared deontic authority (Stevanovic and Peräkylä, 2012) with regard to decisions about items to be dealt with next.

4.3. Aborted pointing: addressing a dispreferred response

Whereas in the previous examples (Excerpts 2–5) the chair's orientation to progressivity allows for smooth initiation of projected action, in our final case this kind of foreshadowing leads to a witnessable problem: here, pointing to a relevant item is aborted instantly upon a negative reaction. This move (initiated as soon as clicking the item becomes obsolete) further demonstrates that the mouse cursor plays a pivotal role as an interactive resource drawn on in negotiating tasks and responsibilities and joint decision-making.

The example is a passage from the same meeting as excerpts 1 and 2, which was chaired by Roosa. At this point during the meeting, the participants are going through new requests in the system. These requests are visible as such (represented in the form of a table) in the opened intranet. Clicking on a new request will bring into view a pop-up window allowing the chair to edit (e.g. adding more information as well as names of persons responsible for taking care of the issue at hand). Here, the co-workers are concerned with a request that asks for a software manual to be updated. When addressing the request, they refer to screenshots to be included in the manual but conclude that the capturing of the necessary images and thus the task of updating the manual fall into the area of expertise of not present others. In the beginning of this exchange, Roosa indeed opens the editing window of the task, but she closes it – without making any changes – soon after it becomes apparent that the group may not be responsible for attending to the job. However, Henna objects to this implication by reminding the group that they could proceed with the task themselves using the snipping tool. The excerpt begins with Roosa's agreeing response (Fig. 15, line 1), which is followed by her interrogatively formatted request addressed to Henna (line 3):

Excerpt 6 (intra meeting P2/04:28–04:40) (roosa (chair), henna)

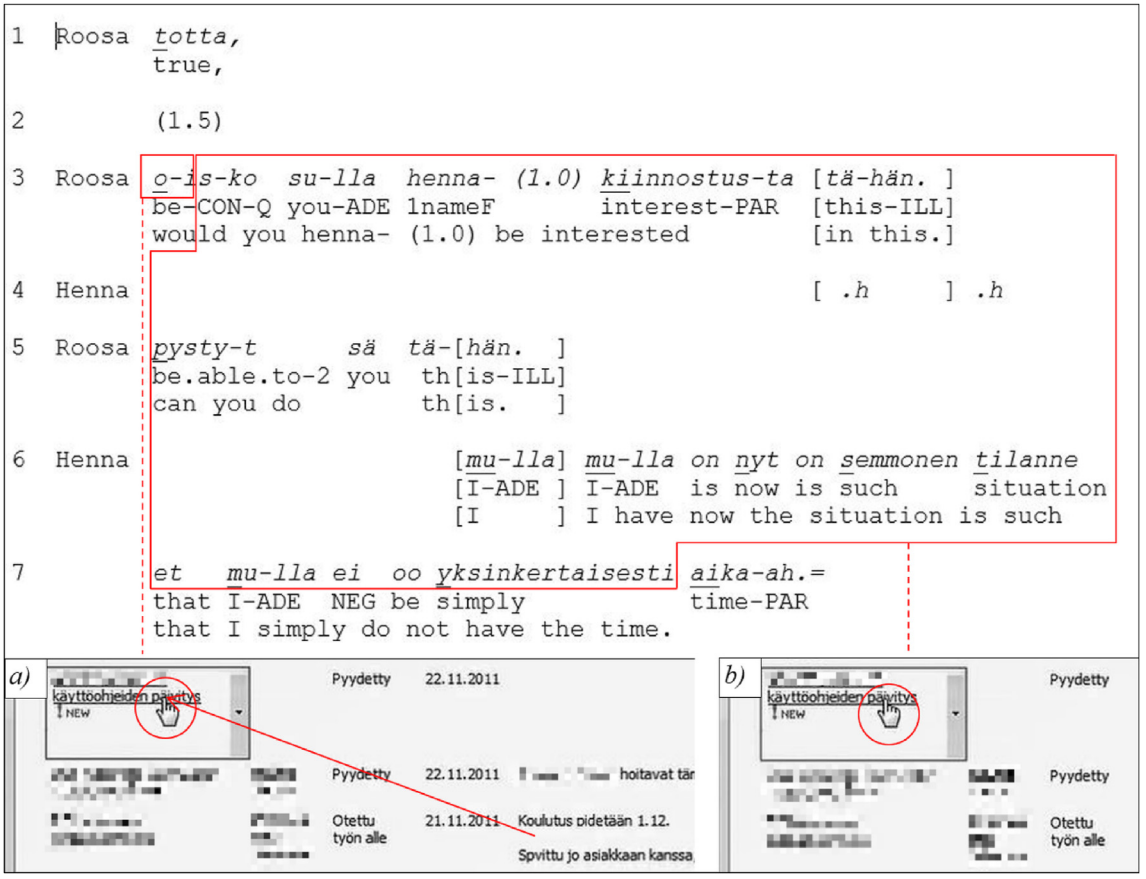


Fig. 15.

Roosa's request initiates a negotiation sequence to establish whether to reopen the editing window to edit the task (updating the manual). At the beginning of her turn-constructional unit at line 3, Roosa moves the cursor back to the associated link where it remains hovering for the time being (now in the emblematic form of a fist with an extended index finger) (Fig. 15). Roosa's actions are occasioned by Henna's preceding turn. She treats Henna's assertion as a display of some special know-how related to the task and asks whether Henna is available for attending to the job. Again, Roosa's use of the pointer is visibly preparing for the possibility of a positive response, orienting to making relevant changes to the item. Thus, the verbal turn, accompanied by mouse cursor pointing accomplish a request that invites a complying response. While Roosa, as the chair, has the technical agency to click the item to open the respective editing window again, her pointing (and not clicking) orients to the projected action of reopening the task as negotiable, as something to be done in collaboration with Henna, if at all.

In overlap with Roosa's '*this*' (line 3) Henna can clearly be heard breathing in. She is thus not only anticipating the end of Roosa's turn and notably preparing for the production of a reply, but also marking her upcoming response as dispreferred. However, before Henna can begin to formulate an answer, Roosa extends the question to include a possible impediment for taking over responsibility, which downgrades the request allowing for the option to say 'no' (line 5). At line 6, at a point that projects the end of Roosa's expansion, Henna provides an answer in the form of an account, which embeds her refusal to take on the open task: it is not a question of interest or skill, but of time (lines 6–7). Her turn is marked as dispreferred also through repetition ('*I I have*' at line 6), reformulation and hedging ('*I I have now the situation is such*' at line 6), and by the use of an intensifier ('*simply*' at line 7). During the turn-final word at line 7, Roosa begins to retract the pointing gesture by moving the cursor to the right – away from the link (Fig. 16a). She thus abandons the option of clicking to proceed with the task, visibly orienting to Henna's rights to making a decision in this matter:

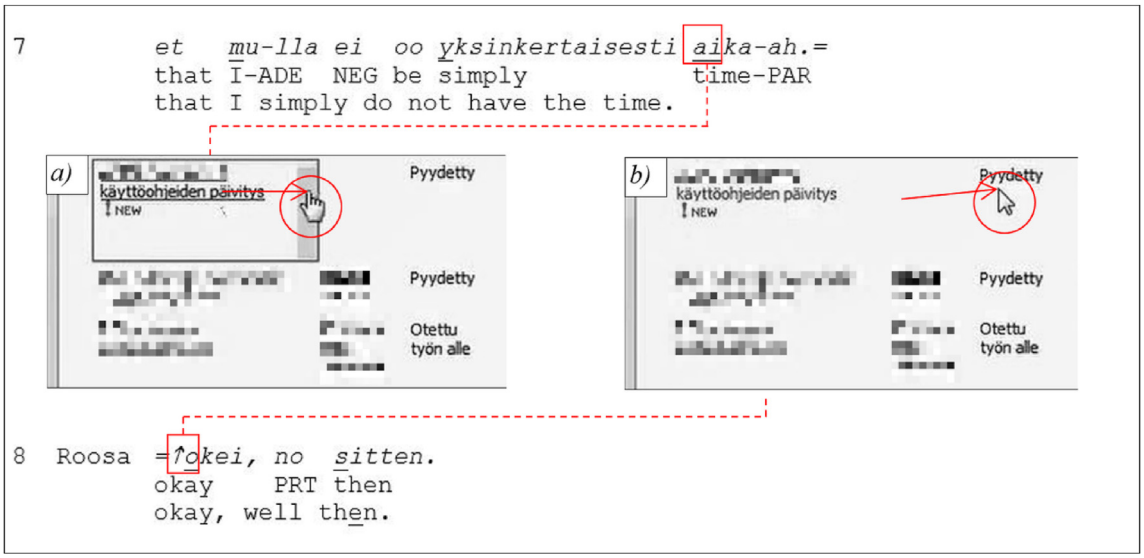


Fig. 16.

The sequence ends with Roosa verbally accepting Henna's refusal. She produces a short and high-pitched '*okay*' (Fig. 16b, line 8) while continuing to move the cursor further toward the center of the screen. The prosodic features of Roosa's '*okay*' make it sound almost cheery, indicating that Henna's rejection does not pose a problem. The cursor comes to a halt and remains at "*Requested*" while Roosa now utters '*well then*' (Fig. 16b, line 8). Clearly, the acceptance of the refusal commences already at the end of line 7 (Fig. 16a), while Henna is still speaking. It is the entire ensemble of cursor movement and utterance, then, that works towards accepting Henna's response and consistently yields her agency on the matter.

This excerpt further illustrates the different functions of cursor pointing. Firstly, it is used for deictic reference: moving the cursor to point at the on-screen request indexes the task and specifies the referent of the deictic expression ('*in this*', line 3). Secondly, Roosa keeps the cursor almost still in place, hovering above the associated link, marking the openness of the request until it becomes clear that Henna is not available for this task. She thereby visibly awaits Henna's response, treating the choice between clicking and not clicking as a joint decision. Thirdly, keeping the cursor on top of the link (pointing at it), which – once clicked – directs to the respective editing pop-up, displays readiness to open the link again in order to make changes. This is interesting in view of her downgrading the request at line 5 (Fig. 15). While allowing for a 'no', Roosa still prepares for particular actions, namely clicking and editing, both of which would become relevant if Henna agreed; she visibly orients to the possibility

of receiving a positive answer, and thus to the progressivity of the current activity. Lastly, moving the cursor to the center of the screen in reaction to Henna's refusal not only marks immediate closure as it becomes clear from Henna's reaction that there is no reason for editing, it also directs the attention away from the issue and thus away from the interactional problem of the rejection. Roosa treats the open request as something that should not remain in the group's focus any longer.

5. Conclusion

The embedded character of gestures, especially those that contribute to establishing and maintaining co-orientation has been an important discovery of previous research concerned with the multimodal achievement of face-to-face interaction. The pivotal role of the material ecology for the intelligibility of embodied action and for the mutual management of referential practices is particularly interesting with regard to the often limited access to co-participants' local realities in video-mediated communication (Luff et al., 2003; Luff et al., 2013; Luff et al., 2016; see also Hjulstad, 2016; Heath and Luff, 1991, 1993, 2000). However, as we have shown throughout our analysis, an on-screen domain can in itself become an interactional environment that enables users to employ virtual gestures as integral part of the situated accomplishment of technology-mediated shared tasks. The cases presented here illustrate how an inherent technical tool is transiently transformed into an interactive resource for managing participation and distributing agency. Mouse cursor movements are deeply entrenched with the job at hand and finely coordinated with other activities together doing referential work, soliciting responses and making decisions about next actions (e.g. clicking or not clicking to open a new domain of activity). Essentially, these observable orientations to diverse (user-initiated vs. pre-designed) technological affordances and specifically the ways they are subtly integrated (and changed in accordance) with the course of action, illustrate that the "plasticity of gesture with an object and their situated adjustment to the ecology of action" (Mondada, 2014a, p. 143) extends to technology-mediation providing for a virtual ecology of action.

Thus, our work yields valuable insights into complex, device-specific features of a multimodal practice that can be witnessed in a certain type of technology-based interaction. By demonstrating how the mouse cursor is adapted in ways that afford utilization beyond its pre-designed purpose, this paper constitutes an example of how CA-studies can not only contribute to an understanding of actual uses of and orientations to technology in interaction, but also unveil how user expectations might at times divert from the intended meanings of a tool aimed at by developers and designers (Arminen, 2005). Observations such as the ones presented here encourage rethinking the role of information and communication technologies for human conduct – especially in the light of constant technological change – and can help solve issues related to what kind of support is indeed required for distributed group work involving focused activities.

In our data pointing with the mouse cursor is not confined to locating referents, which corresponds with recent findings on pointing in interaction indicating that referential gestures can take on further interactionally relevant functions for co-participants (e.g. Mondada, 2007; 2014a; 2016; Hindmarsh and Heath, 2000; Knoblauch, 2008; see also Frobenius, 2013). Our examples illustrate how different uses of the mouse cursor serve different interactional functions. While cursor movements without talk or in combination with quiet whispering are designed to bring into focus and project on-screen items to consider, they do not make relevant co-participant responses. Rather, they make visible the chair's self-directed actions when considering and selecting items to address (Excerpt 1). By contrast, pointing at an item and holding the gesture beyond the completion of a sequence-initiating verbal turn establishes a strong expectation for an affirmative response (Excerpts 2–6). Chair-directed mouse cursor movements – as carefully timed elements of a multimodal action package – contribute to mobilizing a response and set up preference for an aligning response. This finding complements Stivers and Rossano's (2010) earlier work illustrating response-mobilizing features at the level of syntax, prosody, gaze and epistemic primacy. As our analysis shows, the inventory of response-mobilizing resources includes embodied preparation work accomplished by virtual pointing within the ecology of action in screen-based technology-mediated shared tasks.

In addition, our data shows that virtual pointing gestures that co-occur with sequence initiating actions such as questions display the current chairperson's orientation to the progressivity of the job at hand and to the respective rights and obligations of the participants. By pointing at a clickable item and holding the mouse cursor in position beyond the verbal turn and well into the response in progress, the chair treats the imminent next action (e.g. opening a domain of activity) as negotiable and subject to a joint, sequentially unfolding decision. In this way the chair, who has the primary right to take action, orients to shared deontic authority (Stevanovic and Peräkylä, 2012).

The observation that in these particular, technology-mediated meetings an expectation for an answer is built in a multimodal, environmentally coupled way, opens up new questions with respect to the situated shaping of response-mobilizing activities in other – distributed or co-located – settings involving collaborative work and shared tasks. Following the assumption that "preparation techniques can be expected in any kind of joint-action setting" (Dausendschön-Gay and Krafft, 2009, p. 266), future studies should investigate how such techniques combine with interrogative syntax, interrogative prosody, speaker gaze, epistemic primacy and deontic authority, and how they are adjusted to different tasks and ecologies.

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Declaration of competing interest

None.

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Appendix A. Transcription Conventions

.	falling intonation contour
,	level intonation contour
¿	slightly rising intonation contour
↑	sharp rise in pitch
↓	sharp fall in pitch
minä	Emphasis
[	beginning of simultaneous talk
]	end of simultaneous talk
(.)	Micropause
(0.5)	silences in tens of a second
(( ))	transcriber's comments, descriptions of nonverbal actions
:	preceding sound is stretched
se-	glottal stop or cut off
°joo	whispered talk
=	latches between words or turns
>joo<	increased speech rate
<joo>	decreased speech rate
.joo	word produced with inhalation
.h	audible inhalation
H	audible aspiration
( )	uncertain hearing

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