

## Multiplex conversations afforded by technology

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### Abstract

*This article presents results from a small-scale pilot study investigating linguistic production and structural patterns while multitasking and interrelating these findings with communicative context (Field, Tenor and Mode). The explorative microanalysis shows that whereas the language used by the informant seems to be influenced by all three contextual variables, Field, Tenor and Mode, the navigation between channels in this specific multiplex communication situation strongly correlates to the affordances of the Mode of conversation and more specifically to the ways in which the informant receives indications that her reply is requested. The article includes design considerations and a discussion concerning methodology and ethics. This study and the findings presented here are considered a first building block in constructing a theory for explaining communicative choices when multitasking.*

### 1. Introduction

When referring to how young people make use of digital communication devices, the notion of *multitasking* is often mentioned [17]. A quite common image is that of a person sitting in front of his or her computer both using Instant Messaging, posting on a web forum, playing a computer game, talking over Skype and writing SMS messages semi-simultaneously. The ability to multitask is not something which is unique for communication via new media, but the use of new media results in communication situations that offer participants new combinations of options for interaction. Here they find themselves in multiplex discourse scenarios, where different discourses are interwoven.

In recent years, the multitasking phenomenon has received increasing attention from researchers who have mainly focused on the cognitive aspects of

multitasking and how it affects and is affected by mental capacities [4, 14]. However, there are only a few studies that focus on the impact that this phenomenon has on the socio-communicative context, something which Naomi Baron notes in one of the few articles dealing with this subject [1]. In this article, she presents results from an innovative study where undergraduate students were asked to reply to a questionnaire concerning their current activities directly via Instant Messaging, and she discusses how different media with different affordances offer multitaskers different solutions for how to control interactional patterns (“volume control”). Hillary Bays also studies multitasking, but instead of focusing on the complete multiplex situation, she has chosen to investigate the different modes within Instant Messaging with a focus on temporal aspects [2]. From her description of the method employed to capture the details of these conversations it is clear that this material is in itself very complex. Another example to be mentioned here is Eli Dresner’s theoretical framework for studying “conversational multitasking” [5]. To the best of the author’s knowledge, however, there are no empirical studies based on observation and detailed studies of linguistic material investigating the affordances of complete multiplex communication situations and how these are reflected in communicative patterns. This is where this study may hopefully contribute.

The results presented in this article are preliminary findings from a small-scale pilot study that was carried out in May 2006. This qualitative study empirically explored what characterizes the multiplex communication situation of one multitasking informant over a two-hour period at the computer. In order to provide a comprehensive picture, the analysis takes the whole communicative context into consideration, and it is investigated how the *Field*, the *Tenor* and the *Mode* [8] of the different conversations influence the linguistic production of the informant, as well as

conversational structures in both the separate channels and in the complete multiplex communication situation. The article further presents design considerations and implications for further research.

## 2. Register and communicative context

When we communicate, we tend to adapt e.g. level of formality depending on situation. For example, we often use another style and different vocabulary when talking to close friends than when talking to new acquaintances. This phenomenon is sometimes referred to as *register variation*. M.A.K Halliday and Ruqaiya Hasan present a theory of register variation, and argue that the variables that influence the way we express ourselves in a given situation concern the Field, the Tenor and the Mode of the conversation in which we are involved [8]. Somewhat simplified, the Field is the topic of a conversation, Tenor refers to conversation participants' roles and interpersonal relationships, and Mode concerns the material qualities of the medium of delivery. Since the main difference between computer-mediated conversations and conversations in a face-to-face setting concerns the Mode of the conversation, the importance of this variable will be further developed in the following.

When investigating the effects of mediation on communicative patterns, a central question concerns the role of the medium. It is here argued that every medium we use for communication has certain material qualities in its design, presenting people employing it with certain options for interaction. This is in line with James J. Gibson's ecological theory of *Affordances*, which focuses on the complementary relationship between the individual and his or her environment [7]. This theory has since been applied to Human – Computer Interaction, for instance by Donald Norman [12], [13] and William W. Gaver [6]. Ian Hutchby [11] has further shown that this theoretical framework can be used to investigate the impact of technology on interpersonal communication and has exemplified this by analyses of, for instance, telephone conversations. In his studies he interrelates affordances and conversational structures by applying methods from conversation analysis.

A focus on affordances makes it possible to ascribe high prominence to the material qualities of the medium without claiming that everything is a result of technological influence. Even though the built-in functions of the medium play an important role, the patterns found in linguistic production and conversational structures also reflect the complete communicative situation and the choices that the

interlocutor makes. From this follows that by investigating actual conversational patterns, it is possible to identify the options for interaction in the environment that stand out to the interlocutor as being the most advantageous ones in a specific situation. In the present study, not only the communicative affordances of the different media are investigated, but also the affordances of the complete communicative situation in which the interlocutor is involved.

In a multiplex communication situation, there is a complex interrelation between the notions of Field, Tenor and Mode. Not only do they determine register and conversational structures, but there also is cross influence between the different variables. For example, the number of participants involved in a conversation (Tenor) is influenced by the affordances of the Mode and whether or not it supports multi-party conversations. Considering that different modes have different affordances, it would also seem plausible that both Field and Tenor of the planned conversation would influence interlocutors' choice of Mode for a specific conversation. Building on this appreciation of the complexity of the variables, the following general questions are explored in the current study:

*What characterizes the linguistic production of the informant in the different modes? How does the informant navigate between the different modes in the multiplex communication situation? What general patterns can be identified and how can they be explained? How do these findings relate to Field, Tenor and Mode?*

The findings of this study should give important clues concerning the choices made when multitasking and should generate suggestions for application design that supports multitasking.

## 3. Method and material

The design of this study provides access to material for detailed analysis of linguistic and temporal features of interaction as well as information about the general communication habits of the informant.

An important reason for the relative scarcity of linguistic studies of multiplex communication may be the various ethical and legal considerations encountered when gathering this type of material. In order to ensure that the method employed in this study would follow ethical guidelines and governmental laws, several precautions were taken during the detailed two-hour observation. The requirement of informed consent was met by refraining from filming

any details of the interaction during the observation. Instead, the computer screen was video taped with a blurred focus to capture general movements on screen in order to provide some details concerning the temporal, modal and spatial distributions of the online conversations. The linguistic analysis was based on log files, which the informant automatically gathered on her computer. Before handing these over to the researcher, the informant would contact the other participants to get informed consent, and in synchronous interactions, she was asked to give this information in the very beginning of each conversation. The log files accessed were then matched with the video recordings and the notes from the observations and were put in a joint transcript, where each action was timed in tenths of seconds.

A second step will be to complement this observational material with information gathered in a diary that the informant kept for one week after the observation. Here, she was asked to list all conversations she was involved in and to specify information regarding interlocutors, type of topic, approximate time use and whether other activities were taking place simultaneously. Focus in this article will be on the material gathered during the actual observation, and the self-report diary will be discussed in future publications. In order to account for individual variation, also data from other informants needs to be included in future work.

### 3.1. The multiplex situation

During the two hour observation, the informant, A, a 28 year-old Swedish female, working in a computer-related field, was sitting at her desk in her work environment. In the course of the observation she was involved in three different ICQ conversations, she had one IRC channel running and was involved in four face-to-face conversations. At one point her cell phone rang, but she chose to switch it off. She also briefly surfed the web on a few different occasions, and once she checked her web mail. Throughout the session she also kept a work related window open in the background, to which she kept returning. It should be noted here that when asked after the session, A stated that she had been multitasking more here than she usually would while at work, but that this situation rather resembled a session at the computer at home (for instance, she would normally not use IRC at work). In some of the conversations in which she is involved during the session, she also complains about how slow her work computer is, and on many instances during the observation, she uses the time it takes for her work related documents to load to multitask.

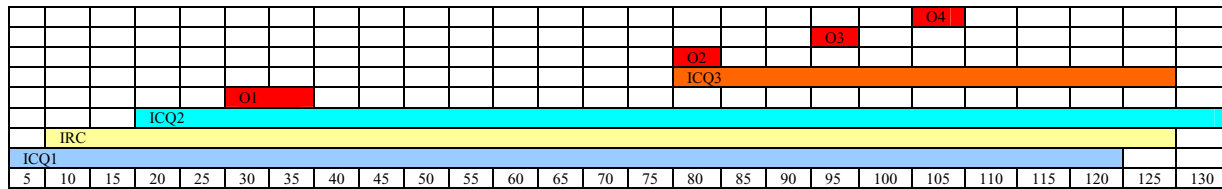
In order to present an outline of the components of the complex communication situation, Table 1 gives a simplified overview of how the conversations were distributed over time (each column in the table corresponding to 5 minutes). This display does not take pauses in conversations into consideration, but only shows when the first and last messages of each conversation were posted. As Table 1 illustrates, during the two hour observation, the informant was involved in five simultaneous conversations at the most.

Further, Table 2 shows the details of the temporal dimension in seconds. Here, the figures concerning the mean time each window is highlighted are complemented with information about Standard Deviation (SD) and Interquartal Range (IQR). This should hopefully provide a more accurate picture of the sometimes very wide-spread distribution of highlighting times, where the average time spent in one window before switching to the next is 26.01 seconds. It should be noted that in many of the areas investigated here, the figures for Standard Deviation are quite high. This is only natural considering the fact that many of the measurements concern behaviour where great variation is to be expected (for example highlighting times, number of characters per utterance and response times).

Since it is impossible to know exactly where the informant is focusing her attention (eye-tracking would be useful here), it was decided to instead focus on highlighted windows. During the oral conversations, there are other windows highlighted throughout, but, as will be shown, this does not necessarily mean that the informant pays attention to what is happening on the computer screen.

For the most part, when a window is highlighted, the other windows are completely covered, and the only automatic pop-ups that can change the visual input that the informant gets are the ICQ alerts which become visible (and audible if audio is switched on) as soon as the other person involved in the ICQ conversation has posted a new message. However, at times when ICQ has been highlighted directly after IRC has been used, the IRC window is still visible in the background and so on these occasions the spatial layout affords the informant also to keep track of that conversation. It should be mentioned here that one possible explanation why there are so few examples of windows aligned next to each other in this material could be that the informant was asked to lower the resolution of her screen to 1280\*1024 pixels so that the recording could be made.

**Table 1: Conversational distribution (in minutes)**



**Table 2: Details of the temporal dimension**

Window	Total time highlighted / oral activity in focus (seconds)	Number of times highlighted	Mean time highlighted (seconds) (SD; IQR)	Total time highlighted while other window simultaneously visible (seconds)	Simultaneously visible window (seconds)
IRC	1395,4	57	24,5 ( 22,7; 6,1-34,7)	457,4	ICQ (457,4)
ICQ1	1212,0	32	37,9 (45,5; 12,3-44,5)		
ICQ2	731,0	41	17,8 (23,4; 6,4-17,6)		
ICQ3	503,7	21	24,0 (105,6; 8,7-29,9)		
Web page	284,7	25	11,4 (55,9; 2,5-10,3)		
Work window	2935, 0	66	44,5 ( 352,6; 17,8-64,1)		
Desk top	88,3	4	22,1 (30,2; 22,4-28,9)		
Oral 1	422,7			422,7	Work window (64,6); U takes over the computer (358,1)
Oral 2	189,2			189,2	ICQ3 (52,8); Work window (121,6); Web page (14,8)
Oral 3	74,1			74,1	ICQ2 (74,1)
Oral 4	12,3			12,3	ICQ1 (12,3)

**3.2. Field, Tenor and Mode of the conversations**

During the observation, apart from working, the informant spends most time conversing in IRC and ICQ. These two written modes are quite similar in that they allow for synchronous interaction; interlocutors are logged on at the same time, and can view each other’s messages as soon as they have been posted. In neither of the applications do you see the message as it is being typed, nor do you get any indication whether the other person has started typing (as you do in MSN Messenger, for example). However, as previously mentioned, in ICQ you do get an alert once a new message has arrived on screen. It should be noted here that the informant chose to interact at her computer with the audio turned off. For this reason the impact of audio alerts is left out of the analysis.

One of the main differences between these two modes relates to Tenor, and more specifically to the different requirements for participation in the two modes. ICQ is used for conversing with people added to one’s list of contacts, most often one-on-one. IRC, contrarily, usually involves multiparty conversations. It consists of different channels, some of which are open to anyone and others which are private. During the specific conversation observed in IRC, the informant was logged on to a work-related open channel, and the only instance she received a private message through a so called back channel was when another of the participants sent her a private link after first having mentioned this in the open channel. In the open IRC channel used here, it is also possible to identify threads that are separated from the rest, both regarding topics and participants, to such an extent that they could be viewed as distinct conversations. However, since everyone present in this channel has the option to take part in all visible threads, interaction in this IRC channel is viewed as one single conversation here.

**Table 3: Field, Tenor and Mode**

Conversation/ Mode	Field	Tenor	Language
IRC	The study, work-related tips and comments, computers, computer games, family and computer games, work vs. pleasure, courses, moods, private plans, offline interference.	16 people in total pass through this channel. A knows most of them from chatting with them in here before.	English
ICQ1	The study, plans for the day, slow computers, job offers, disadvantages of smileys in ICQ light, problems at Q's work, jokes about how to take care of those troubling her, food, good nights	Online friend since seven years back, whom A has met three times.	English
ICQ2	R contacts A and asks her to check for something he has left in her office, the study, language related issues, R's new job, computer games, articles online, R asks a favour of A, TV series	R lives in the same town as A, and they are very good friends. He is dating S.	Swedish (some English)
ICQ3	S contacts A to tell her about an online service she has found and then asks for a web address, the study, plans for the weekend, computer games, language related issues, jokes about nicks	S also lives in the same town as A and is a good friend of hers. She is dating R.	Swedish (some English)
Oral 1	Slow computer (they also check settings etc.), low resolution, computer games	U is A's employer	Swedish
Oral 2	The need for a new computer screen, A's work	U is A's employer	Swedish
Oral 3	An event in which A plans to take part	A does not know V from before	Swedish
Oral 4	If A can look after some technological equipment while he takes his lunch.	X is one of A's co-workers	Swedish

Table 3 gives an overview of the Field and the Tenor in the different conversations in which the informant was involved during the observation. It also includes information about language used. The informant uses English when conversing with her English speaking contacts and for the most part she uses Swedish with the others. However, in ICQ2 and ICQ3 a number of English words can be identified. For instance, the last two utterances in ICQ3 are all in English:

S: time for lunch  
 A: have a good one ;)

During an informal interview, the informant also comments on language use and argues that even though Swedish is her native language it is much

easier for her to use English when chatting, since she is more used to this.

## 4. Results

### 4.1. The production of the informant

In order to compare the linguistic production of the informant in the different modes, two dimensions have been investigated, concerning structural features and register respectively. The structural focus on this level is on numbers of characters, words, sentences, paragraphs and topics per sent message (utterance) in the production of the informant. The findings are summarized in Table 4, together with figures for Standard Deviation (SD) and Interquartial Range (IQR).

**Table 4: Utterances produced by the informant**

	Mean number of characters/ utterance (SD; IQR)	Mean number of words/ utterance (SD; IQR)	Mean number of sentences/ utterance (SD; IQR)	Mean number of paragraphs/ utterance (SD; IQR)	Mean number of topics/ utterance (SD; IQR)	Total number of utterances produced by informant
IRC	54,3 (44,0; 17,0-80,3)	10,39 (8,1; 4,0-15,0)	1,41 (0,6; 1,0-2,0)	1,00 (0,0; 1,0-1,0)	1,00 (0,0; 1,0-1,0)	71
ICQ1	117,6 (95,1; 55,5-174,0)	22,19 (18,1; 9,0-31,5)	3,53 (2,4; 1,0-4,5)	1,63 (0,7; 1,0-2,0)	1,47 (0,6; 1,0-2,0)	32
ICQ2	57,3 (55,0; 16,0-81,0)	10,57 (10,0; 3,0-13,0)	1,59 (0,92; 1,0-2,0)	1,27 (0,54; 1,0-1,0)	1,19 (0,44; 1,0-1,0)	37
ICQ3	73,6 (92,2; 17,0-98,8)	13,43 (17,0; 3,0-16,3)	2,09 (1,6; 1,0-2,8)	1,43 (0,7; 1,0-2,0)	1,22 (0,5; 1,0-1,0)	23

In order to generalize these findings, more data is needed. Nevertheless, some interesting patterns emerge in A's production in this specific situation. The informant produces the longest utterances in the ICQ1 conversation, whereas the shortest are produced in IRC. Interestingly, the production in ICQ2 and ICQ3 more closely resembles that of IRC than that of ICQ1 in this structural respect. There are two possible explanations for this pattern. First, the Field of conversation in ICQ1 is quite different from that of the other conversations. Here interlocutors discuss a quite serious matter, and Q has long elaborations concerning this topic (the longest consisting of 937 characters). Another reason why this pattern emerges is that both participants in this conversation use a somewhat different strategy for turn management than the others. Rather than sending off one message for each topic, they divide their utterances into separate paragraphs (often as many as 3 per utterance) dealing with different topics. This results in a turn-taking pattern which is quite similar to face-to-face interaction in that turns are taken in order whereas sequencing differs greatly from what can be found in a face-to-face condition. This conversation has also a low pace compared to the others. It should be noted here that the informant has a tendency to produce these types of entries also in the other ICQ conversations, but here her communicative partners do not, and so she seems to adapt to the conventions applying in each specific case.

IRC does not afford this type of turn construction, since pressing the return key will result in the message being directly posted. However, it appears as if the informant prefers longer utterances than average also here. Her 54.25 characters per utterance (SD: 44.0; IQR: 17.0-80.3) can be compared to a mean of 35.57 characters per utterance (SD: 32.7; IQR: 10.0-49.0) for the other participants' 346 utterances total, and her 1.41 sentences per utterance (SD: 0.6; IQR: 1.0-2.0) to the others 1.09 (SD: 0.3; IQR: 1.0-1.0).

Let us now turn to the register of the informant in the different conversations. Previous research has shown that written computer-mediated communication (CMC) often displays speech like qualities [9, 10], but has also pointed out that variation can be detected between different forms of CMC, relating to both medium and the broader situation [16]. The quite novel features of register investigated in the current study are the use of smileys (":/"; ":D"), emotes ("\* A yawns"; "\*sigh\*"), abbreviations ("atm" = at the moment) and what I have referred to as "word play". This notion comprises onomatopoeic expressions, emphasis through multiplied letters in words and other types of innovative uses of the written mode ("Bwahhaahaha", "hehe"). In order to exploit further variables that could indicate level of formality and intimacy, it has also been investigated to what extent the informant follows traditional punctuation and capitalization rules. It should be noted that the specific variables investigated here do not provide a complete picture of level of formality and intimacy. However, the variables chosen are quite easily measured, and can function as a starting point for discussion. Table 5 shows the percentage of utterances in which these features occur in the different conversations.

The results presented in Table 5 do not coincide completely with those in Table 4. For instance, one might have hypothesized that the most non-standard punctuation and capitalization should be used in IRC because of the short utterances there and the general speed of these multiparty conversations. Rather it appears that the most informal language (based on these few variables) is used in ICQ3. Here, A is the least concerned with punctuation and capitalization, and she makes use of the most smileys. This most likely relates to both Field and Tenor of that conversation, since a big part of the conversation has a joking tone and the interlocutors know each other very well. S even comments towards the end of their conversation: "...och vi spårar ur totalt som vanligt....." ("and we're straying off topic and getting silly as usual").

**Table 5: The informant's linguistic production**

	% of utterances containing smileys	% of utterances containing emotes	% of utterances containing abbreviations	% of utterances containing word play	% of utterances with traditional punctuation	% of utterances with trad. punct. + punct. omitted after smiley	% of utterances with traditional capitalization
IRC	46	6	3	17	44	89	61
ICQ1	50	41	3	34	34	74	69
ICQ2	46	3	3	43	54	73	49
ICQ3	70	17	4	22	22	52	17

It can further be noted that the informant uses the most emotes in ICQ1. Again, it appears that the two participants here, A and Q, have developed a common set of conventions that they use when conversing here; they both employ more emotes than any of the other participants in the conversations analyzed. Other observations include that A hardly uses abbreviations at all, and that she often uses traditional punctuation, apart from when she ends a sentence with a smiley.

#### 4.2. The intertwined channels

The turn-taking and sequencing patterns observed in the separate channels are interesting in themselves, but when investigating them in their context of production, new conclusions can be drawn.

Considering the many demands on attention when multitasking, one question which seems relevant in this context is to what extent people involved in intertwined communication channels are able to maintain sequencing patterns. To investigate this for the informant, focus will be on adjacency pairs. Adjacency pairs are conventionalized sequences where after the first part of the pair has been uttered, a reply is to be expected (as with greetings and questions – answers) [15]. In the analysis, those adjacency pairs have been identified where A is expected to participate with the second component of the pair. In the material, we find 40 utterances directed specifically at A, where a response is expected. Within varying time frames, she replies to all of these. Eight examples of general address have also been identified among the first part of adjacency pairs in the material (all in IRC). Of these she replies to five. She does not respond to one greeting and two general questions. If comparing to other situations when larger groups are involved, it cannot be expected that everyone will reply to every general question. We can thus conclude that the informant is able to maintain sequencing patterns at least in this respect.

One factor which has a great influence on the timing of A's contributions is that she is also involved in other simultaneous activities. This becomes especially clear when she is involved in oral discussions. Although she sometimes completes the message she is typing and sends it off even though she has been approached by someone in the physical room, or sometimes begins typing again before the oral conversation is over, this interference appears to be distracting.

Communication partners will also have to draw their own conclusions regarding response time. In ICQ, A never excuses herself if it takes her longer time

than average to reply. Again, this is most likely due to the fact that the conversations she carries out here follow conventionalized turn-taking patterns and that everyone involved in the ICQ conversations are aware of the affordances of the alerts and thus know that the person on the other end will reply as soon as possible. This is in line with Common Ground Theory, where it is argued that participants in conversation continuously need to reach common ground concerning both the structure and the content of the conversation [3]. In ICQ, the affordances of the medium allow for these specific conventions, and it appears as if the participants in these ICQ conversations are aware of them and follow them.

In IRC the situation is slightly different, since there are no alerts to indicate that your response is asked for. Here, two examples can be used to show the different strategies applied when having "lost the thread", as the informant herself put it. At one point the informant simply posts a question concerning a new topic to start off on a new thread, and on another occasion she states: "I've so totally lost track of what you guys are talking about, it's not even funny. Fill me in. Like the dummy-version :D". The first of these strategies A used after not having focused on this conversation for 130.1 seconds while dealing with some technical issues, leaving her with 17 unread messages, and the second when she found 28 new messages awaiting her when returning to IRC after 189.9 seconds spent in the work window and reading and responding to a long message posted by Q in ICQ1 (this was during the most active time period in the IRC channel). After having posted this request, the informant immediately switched windows to return again 57.7 seconds later.

One emerging pattern concerning the temporal organization of A's communicative practices which became apparent already during the observation, is that she often seems to switch windows directly after having typed and sent her message. More exact measurements show that in ICQ this happens with 89.8 percent of the utterances. In IRC, on the other hand, she switches windows directly after an utterance only with 52.2 percent of the utterances.

So, what is it then that causes her to keep IRC highlighted after having posted? In order to see whether there is any correlation between this and sequencing patterns, it was investigated whether she behaves differently after having posted a first component of an adjacency pair, since she in this case should be expecting a reply. In IRC, 23 instances were identified where A has posted a message to which a reply is to be expected, and only in 7 out of these does she keep IRC highlighted after having posted. So, what then might the other reasons be for staying around?

Again, we can find explanations with Mode in relation to both Tenor and Field. For example, there are many different participants in this conversation, following different threads simultaneously, and as a result new utterances are posted quickly. In a comment, A states that she finds it difficult to keep track of the conversations in IRC since there is so much text. The fact that you do not get any alerts here, of course also has a great impact on what strategies you can use.

This can be compared to ICQ, where 18 first part adjacency pairs were produced by the informant. On all of the instances where the informant explicitly has shown that she expects an answer in this way, she switches windows directly after having posted. It seems plausible to assume that she knows that it will take her interlocutor some time to type a response, and also that she will receive an alert when this has happened, and so she can return to her other activities. On the very few occasions where no switch occurs, this does not relate to sequential implicature, but instead A takes a second turn to clarify or repair, to comment on smileys and to say good-byes.

The important role of the alert function is also reflected in the choices A makes when deciding which medium to switch to. In no less than 87.5 percent of the 57 instances when an ICQ alert has popped up, is the first window she switches to an ICQ window. Only on seven occasions does she deviate from this pattern. Three times she first changes the settings, one time she first checks IRC where she is expecting both replies and further questions concerning the study which she has just informed the others about. Towards the end of the session, on three occasions she also switches to the work window before opening ICQ. Considering the number of alerts here, it seems as if it would be impossible to get any work done if responding to them directly every time.

The mean time it takes the informant to react to a visible ICQ alert is 41.4 seconds (SD: 90.8; IQR: 8.7-41.4). This mean time is significantly increased through two instances of unusually long reaction times, occurring during the conversation with U, when he also takes over the computer to check the settings. When these instances are excluded the mean is lowered to 24.8 seconds (SD: 23.5; IQR: 7.2-39.3). This correlation between response time and current activity is further supported by the findings concerning the shortest response time. On 11 of the 57 instances, the informant switches to ICQ within ten seconds. On four of these she leaves her work window for ICQ, on two a web page and on the other five she is just about to send off her replies in other conversations, and can thus leave them quickly.

Only on a few occasions does the informant highlight ICQ without being alerted. One example is when she checks whether Q is still there, and another is when she picks up the conversation with R again after him having excused himself earlier on.

It should be noted here that the results concerning ICQ alerts only can take into account those alerts that are visible in the recording. When having many windows open, additional alerts do not pop up visibly on the blurred video recording, but they are shown as an added number on the alert tab. I have therefore not been able to take into account the more complex alert patterns that arise about 1 hour and 15 minutes into the observation, where the informant is involved in three different ICQ conversations at the same time.

As there are no alerts in IRC, one might ask what other explanations there could be for why A chooses to switch to IRC at a certain point in time. Again, there appears to be no correlation between sequencing and window switching. The mean time between highlights of IRC is even longer on the 16 instances where the informant herself has produced a first part of an adjacency pair and switched windows (129.3 seconds; SD: 200.9; IQR: 9.0-144.3) then on the 41 instances IRC is highlighted again when she has not directly asked for a reply (91.9 seconds; SD: 122.8; IQR: 10.7-115.6). These figures are skewed both because of the inclusion in the material of the short switches A makes when checking links posted in IRC (3 instances in the adjacency pair condition and 7 in the no reply expected condition) and because all four oral conversations cause longer time between highlights (2 instances of this in each condition). When discarding these, a somewhat different picture emerges with a mean time for highlights of 75.6 seconds for the adjacency pair condition (SD: 77.6; IQR: 20.5-115.1) and 81.8 seconds for the no reply expected condition (SD: 67.9; IQR: 29.8-117.0). Thus, there seems to be no significant difference between these two conditions. Rather, it appears that the number of other simultaneous activities, together with level of involvement in these, has the strongest influence here. This is the case not only with simultaneous participation in oral interactions as indicated here, but also with other activity types. For instance, in the middle of the observation there are 15 minutes during which the informant receives no replies in ICQ (Q later posts a long message and R has excused himself). Here, the informant only switches between IRC, web pages and the work window, and is able to keep IRC frequently updated.

As for knowing that others expect a reply from her, this she can see when IRC is highlighted, but most likely also when IRC is visible in the background

while the ICQ window is highlighted. IRC is backgrounded 13 times altogether and of these she returns to this window again on seven occasions. For each of these seven, new messages have been posted while she has been involved in ICQ conversations, and in four of them she has been specifically addressed. On the other six occasions she does not switch back to IRC, and interestingly on these occasions no new messages have been posted since it was last highlighted. Even though one cannot be certain that she sees these utterances, chances are that she is trying to keep an eye on all visible conversations.

## 5. Designing for unobtrusive conversational management

The results presented in this article illustrate that the linguistic production of the informant is influenced by Field, Tenor and Mode. One example of this concerns length of utterances, where the longest utterances are found in the ICQ1 conversation. The fact that ICQ allows for several paragraphs within one utterance is one of the influencing factors here (Mode), another is the serious topic discussed (Field). A third influencing factor is the fact that the people involved in this conversation (A and Q) know each other well and seem to have developed certain conventions for communicating in this environment (Tenor). Similar patterns have been identified concerning linguistic production, but the patterns in focus in the complete multiplex communication situation over time show a different picture. It was not within the scope of the current study to investigate Tenor and Field with the detail needed in order to be able to discard the influence of these contextual variables; nevertheless, the correlation between Mode and window switching identified is strong and worthy of further discussion. In the multiplex communication situation investigated, those conversations were prioritized where it was made known through the interface that a reply was expected from the informant. The ICQ alerts and the informant's standard reactions to the same are examples of this.

However, the findings of the current study further indicate that the ICQ alerts not only are advantageous but that they also cause interruptions in other activities. One of the main challenges for designing multitasking applications thus becomes to integrate unobtrusive conversational management.

One affordance of IRC in this context is that it is less intrusive than ICQ. At times when the IRC window appears in the background, it is possible to identify new messages and to see whether one has

been specifically addressed in an unobtrusive way. From this follows that one way of getting indications without being constantly interrupted would be to try and fit as many windows as possible on one screen and to keep them all visible while one of them is highlighted. This is possible with big screens (or even many screens) and high resolution. However, since you would not get clear indications in all modes that you have new messages or that you have been specifically addressed, the stress to check the backgrounded windows might become overwhelming and your interlocutors may feel uncertain as to whether common ground has been reached.

A solution seems to lie somewhere in between these two alternatives. In order to allow for multiplex conversations that do not interrupt the other activities in which one is involved, one option would be to gather all information about requests for replies in one separate interface. Here, ICQ alerts could be listed without distractingly popping up on screen, and also information about other conversations could be easily accessed at times chosen by the informant. Similarly to a cell phone where one can choose different ring tones and sound levels, this interface should preferably be user-configurable so that one could choose level of intrusiveness depending on conversation. For some conversations, one might want intrusive sound alerts when a new message has appeared in order not to miss anything, whereas for others it is better with less intrusive notifications to avoid constant interruptions. If distant participants knew about this feature, they could also feel more confident that they would receive replies in due time. However, in order for this interface to be of use in multiparty conversations like IRC, one would have to find ways of effortlessly categorizing messages as containing general or specific address, also in the open channels.

## 6. Considerations for future research

The current study design has both advantages and drawbacks. One advantage is the detailed analysis which is enabled by the blurred video recording in combination with the log files gathered. Even though a detailed recording would have been useful, this set-up ensures an ethically and legally defensible study design, as the researcher is not given access to any detailed material before all those involved have given their informed consent. The perhaps most troubling ethical consideration raised by the method employed here does not concern the distant participants, but rather the impact on the main informant. Could she be identified? Even though the names of informants are

kept confidential, could employers use these results against their employees if they knew about the study?

As it turned out, the informant chose to devote her time to the different conversations taking place in ICQ and IRC and did not produce linguistic material in any other mode. An advantage of this is that these modes are quite easily logged; more complex interactions would have been more difficult to capture in detail. However, register variation could be expected to be much greater if access had been given to more formal online writing. In addition, it would have been possible to draw other types of conclusions concerning media choices if more diverse media had been used. Nevertheless, one has to keep in mind that a more complex material would also raise other ethical concerns. How would the informant be able to get informed consent in asynchronous media? This could possibly be done by sending out information to all contacts beforehand, but there is a risk that she would be approached by someone not in the contact list. One solution would be to turn on the blurred film camera in the room and then leave and ask her to only share detailed logs from interactions where she has been able to get informed consent, but especially with more complex media, it would be difficult to base an analysis on this material only.

Despite these methodological concerns, it is important to get access to this type of data. By capturing the complete situation of the informant it is possible to find answers to questions that one normally would have to guess about. Multitasking does have a great impact on timing in the different conversations, and if we did not know that the informant was devoting her attention to other things, we might conclude that she was hesitating or slow at typing. The complex transcript produced helps give an overview of these issues, something which would be impossible to achieve if only investigating log files.

The material gathered in the current study could further be used to investigate other features of the language produced, such as speech acts, or to compare the register of the main informant with that of other participants in conversation. As previously mentioned, there is also data from a self-report diary available, which can be used as a complement to these findings in order to provide a more complete picture of the communicative habits of the informant. Additional future challenges will be to visualize the multiplex patterns identified and, not least, to collect a larger material with the aim of exploring the correlation between affordances and media choices in more detail.

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