

IMAGINING THE PROTOTYPE

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ABSTRACT

This article reports on the analysis of a design session, employing conversation analysis. In the design session three experts and a designer discuss a prototype of a shirt, which has been developed with the input from these experts. The analysis focuses on the type of involvement of the participants with the prototype and how they explicate the points they make in the discussion with or without making use of the prototype. Three techniques for explicating design issues that exploit the prototype are identified: a. gazing simultaneously with pointing, touching and/or manipulating (moving, stretching, turning) b. demonstrating by taking the prototype into use the way it is supposed to be used c. demonstrating by imitating the manipulation or use of the prototype through gesture - an 'imagined' dealing with the prototype. Based on the analysis, it is argued that these techniques offer different possibilities for discussing design issues.

INTRODUCTION

Prototypes are tactile, preliminary, and functional versions of a design. They offer possibilities for evaluating how a design will and will not work. One may see prototypes as resources that assist participants in the design process in envisioning in what ways a product may, could or should be used, and what could be improved, interactively with a designer. Envisioning a future product in use, by users in the future and possibly altogether different setting may be easier (and thus more fruitful) when

some similar product can be touched, pointed at, held, or taken into use, since its functionality thereby can be tried out. Experts that partake in a design session may relate their expert knowledge directly to whatever they experience from the prototype. Designers may thus be expected to encourage expert participants to handle the prototype.

Apart from the prototype, however, participants in a design session may, as they do in most contexts where social actions are accomplished, make use of other artefacts, their own bodies, e.g. by gestures and gaze, and talk. Handling the prototype in itself may or may not be meaningful, but is typically done in and through carefully concerted complex actions that encompass both gaze, bodily movements, gesture, artefact handling and talk. Moreover, although typically only one person has a turn at talk at a time (Sacks, Schegloff, & Jefferson, 1974), other participants may simultaneously make use of gaze, gesture, and bodily movements. This article thus focuses on whether and how participants handle the prototype in the design session, and how that handling, together with talk, body movements, and gaze is used in order to establish intersubjective meaning. The paper is the first of twin papers - the second paper focuses on the set-up of the session and the *intended* use of the prototype in relation to this analysis (see ten Bhömer et al., this volume).

A DESIGN SESSION FOR AN INTELLIGENT SHIRT

The analysis concerns interaction about the design of an 'intelligent' shirt with sensors, which was developed to encourage older citizens to make movements in order to stay fit and flexible. The design session was led by the designer (B). Two physiotherapists (A and P) and an expert on elderly care (C) participated. The participants speak Dutch in this session. They mostly sat around a table during the session:



Fig. 1: Sitting arrangement

Importantly, only one participant, C, gets introduced to the prototype in this session. Two participants saw and to some extent tried the shirt out before the session. The session thus to a certain degree concerns their *earlier* experiences with the shirt.

THE PROTOTYPE AS AN IDEA

One first observation is that participants do not always orient to the prototype as an artefact. In the following excerpt, we see A and P discussing the prototype. B, the designer has asked them to note down which of the previously established ideas for the shirt they recognize in the prototype. Both write for a while, and then they start to inform each other of the features of the prototype that they wrote down for this task.

In Excerpt 1 (see right hand side of the page) the prototype is laid out on the table, but A and P do not look at it, point at it or touch it at all. Instead, they go back and forth between looking at each other and the paper on which they wrote. Furthermore, they do not refer directly to the prototype verbally either - as would have been the case if they had used a pronoun for the prototype as in '*it is fashionable*' or '*it is easy to wear*'. Instead, they directly report the words that they have written on the paper (*I had as a first point this fashionable*, 1.1). The participant seem to treat the assignment as one that should be solved verbally, in that first 'write, then assert opinions about the prototype' assignment. A way of putting this is that the prototype figures in their interaction as an idea rather than as an artefact, and this idea is expressed in words on the paper. This excerpt shows that participants may talk about central features of the design and the prototype but without orientation to the prototype verbally, by gaze or bodily, even though the prototype is right in front of them. We might thus say that when a prototype as artefact is known to the participants from earlier experience, it does not necessarily figure as a resource in explicating design features. Possibly, the

assignment given (writing down) invites the participants to focus on (written) words, rather than on the object.

01 A: k had s eerste dat fashionable
I had as a first point this fashionable
gazeA >P-----
gazeP >A-----
02 (0.3)
03 P: Ja en ik had makkelijk aan te {doen
yes and I had easy to put on
gaze P >paper {>A
gazeA P-----
04 (0.6)
gazeA >paper
05 A: heb ik [op {twee staan he](h)e
I have that as a number two
gazeA >paper {>P-----
06 P: [makkelijk te dragen]
easy to wear
gazeP >A-----
07 A: ja=
yes
gazeA >P---
gazeP >A---
08 B: =(h)e(h)ehe
09 A: .hhh
gazeA >paper
gazeP >paper

Excerpt 1

GAZING AT AND MANIPULATING WITH THE PROTOTYPE

In the continuation of this excerpt (see Excerpt 1 continued below), the designer can be understood to instruct the participants to take the prototype into account (l. 12), by asking a question of how the feature is expressed ('terugkomen' *come back*). B not only verbally encourages to link the insight to the prototype, but also by his gaze and his spread hand addresses the prototype as central.



Fig. 2: Hand spread towards prototype (l. 12 in transcript, Excerpt 1 continued)

10	(0.3)	
11	A: [eh::]	
12	B [(en)] fashionable hoe zie {je {dat eh::m	
	<i>and fashionable how do you see that eh</i>	
	gaze B	{>prototype
	hand B	{spread point towards prototype
13	B eh terugkomen [in et eh	
	<i>eh come back in the eh</i>	
	gaze B >P	
	hand B retreat folded back to body	
14	A: [dat et een {shirt is wat =	
	<i>that it is a shirt that</i>	
	gaze A >B-----	{>prototype--
15	A: ={iemand echt {e::h zonder problemen aan=	
	<i>someone really eh without problems can put</i>	
	gazeA --prototype-----	{>B-----
	handA open palm up over table-----	
16	A: =kan trekken en wat {ook best {mooi is.	
	<i>=on and that is actually quite nice.</i>	
	gazeA ----B-----	{>prototype
	handA ----open palm-----	{beat over proto- type with back
17	B: ja (.) ja	
	<i>yes yes</i>	

Excerpt 1 continued

This has some effects, since A now specifically mentions the shirt (l. 14), directs her gaze to it shortly in l. 14 and again in l. 15, and has a kind of vague pointer to it with the back of her hand (l. 15). However, A does not specifically answers B's question as to which aspects of the prototype make it fashionable, but rather rephrases what she means by fashionable ('best mooi' *quite nice*). Just a bit later in the interaction, the designer further *pursues a response* (Pomerantz, 1984) that points to specific aspects of the prototype, an answer that to a higher degree exploits the prototype as an artefact:

01	B: enne: e:h (0.4)	
	<i>and eh</i>	
02	B: waar zie je dat nu dan {terugkomen in::	
	<i>where do you see this coming back in</i>	
	handB	{>spread point towards prototype
03	(0.6)	
04	A: e[::h]	
05	B: [ja] t is een beetje die herkomstvraag=	
	<i>yes it is kind of this question about origin</i>	
06	B: =zeg ma[ar] dus ehm	
	<i>you could say so ehm</i>	
07	A: [ja]	
	<i>yes</i>	

Excerpt 2

Again, the designer encourages the participants to exploit the prototype as an artefact to explicate their insights. After some more quite abstract talk, the other participant, P, explicates how the shirt is fashionable by taking the shirt, turning it around and showing some fashionable feature:

01	P: ja (.)	
	<i>yes</i>	
	hands P stretches>top of shirt and grabs	
02	P: en ook dat t boordje bevoorbeeld nie eh (.)	
	<i>yes and also that the collar for example not eh</i>	
	gaze P >hands/prototype	
	gazeA >prototype	
	gazeB >prototype	
	handsP flips top of shirt over -- lies in front of P	
03	P: tot hier {zit	
	<i>reaches here</i>	
	gazeP >B >A	
	gazeA >P	
	gazeB { >P	

Excerpt 3



Fig. 3: Arranging the prototype - (1.2 in the transcript Excerpt 3)

Hereby P exploits the prototype as an artefact to explicate the design feature 'fashionable'.

The analyses above show that the mere presence of a prototype not necessarily means that participants will exploit it in their talk about the design. It also shows, that the designer implicitly encourages the participants to do so.

DIRECTING GAZE TO THE PROTOTYPE - POINTING AND MANIPULATING

Furthermore, excerpt 3 shows a *technique* for exploiting the prototype by manipulating it directly. This manipulation can be seen as a display of one specific property of it *to others* that explicates the characteristic of 'fashionable'. In the example above, P deliberately reaches for the prototype in order to show it to the other participants, not to examine it in order to get insights. In this way P seems to use the prototype

to support an opinion she had beforehand, or to present it as such. More generally, manipulating the prototype in this way, as is the case with pointing, is treated by the other participants as an invitation to establish joint attention to the prototype or specific parts of it, or, in Goodwin's words: 'attempting to establish a particular space as a shared focus for the organization of cognition and action.' (Goodwin, 2003). The two other participants have their gaze on the part of the prototype as P is flipping it over and it remains there. In l. 3 P has withdrawn her gaze and hands from the prototype and seeks B's and A's gazes by looking at them in order to direct their gazes at her instead of the prototype. A speaker, having a turn at talk may thus, by demonstrably directing gaze and hands towards objects or contrarily withdrawing gaze and hands, guide the recipients' gaze towards the relevant persons or objects for the talk. Bodily orientations such as gaze, pointing and/or manipulating and talk are juxtaposed - they are produced and understood as a package (Goodwin, 2003). Such direction of attention to the prototype can be understood as an act of reference. Some utterances, specifically those that include deictic expressions (this, that, there, him etc) can only be understood properly by ensuring participants' attention to the entity the expression is supposed to refer to, typically before that expression is made (Hindmarsh & Heath, 2000). This is the case in Excerpt 4. Touching, pointing at, moving and other manipulative (i.e. using the hands) actions with the prototype seem to establish the referent, in this excerpt 'deze twee sensoren' *these two sensors*, l.4. Afterwards assertions are made about that referent (l. 9-12). Note that the speaker actually starts out with making assertion about the referent (l. 1) but then changes her speech to first establish exactly what she is talking about.



Fig. 4: Holding the prototype, l. 2-4, Excerpt 4

01	P: ehm wat ik al {merkte/{is dat eh wanneer je:: <i>ehm what I already noticed is that eh when you</i>
	handsP {>laying out armpit section-----
	gazeP {>armpit section-----
	gazeA {>P-----}{>armpit section-----
	gazeB {>P-----}{>armpit section-----
02	(0.5)
	handsP on armpit section---
	gazeP >armpit section
	gazeA >armpit section
	gazeB >armpit section
03	P: ik had toen bevoorbeeld= <i>I did then for example</i>
	handsP stretches armpit section---
	gazeP >armpit section
	gazeA >armpit section
	gazeB >armpit section
04	P: =deze twee sensoren aangeklikt? <i>click these two sensors?</i>
	handsP holds armpit section---
	gazeP >armpit section
	gazeA >armpit section
	gazeB >armpit section
05	(0.2)
	gazeP >B
	gazeB >P
06	B: mhm
07	P: met een geluid= <i>with a sound</i>
08	B: =ja <i>yes</i>
09	P: en je moet echt een {flinke <i>and you really have a big</i>
	LhandP {moves up over head
	gazeA >P {follows Ps hand
	gazeB >P
10	P: anteflexie {maken? <i>antiflex to make</i>
	LhandP stays up over head
	gazeA >Ps hand
	gazeB >P
11	(0.5)
12	P: wil dat geluidje {afspelen <i>if the sound has to play</i>
	LhandP moves down {on table

Excerpt 4

In this excerpt, the assertions are based on earlier experiences. However, in the course of dealing with the prototype, participants may convey that specific design issues occur to them in that same moment.

An example is Excerpt 5, in which A points at the sleeve of the shirt, while P is wearing it:

01	A:	want dit {dit gaat nu bij haar helemaal zo= cause this this does with her totally like this gazeA >Ps leftarm handA {point at seam on Ps leftarm
02	A	= draaien zie je dat turn do you see that
02	(0.6)	armP slight lift gazeP Ps left arm
03	P:	ja yes

Excerpt 5



Fig. 5: Pointing at the prototype, l. 1 Excerpt 5

A is not only gazing and pointing but also instructs the participants verbally to direct their attention to the sleeve ('zie je dat' do you see that', l. 1), which they do, see fig. 5.

Both when earlier insights are conveyed and when insights are made on the spot, participants thus establish joint attention toward whatever feature is being talked about.

DEMONSTRATING THE PROTOTYPE

Pointing, touching, holding and moving the prototype is one thing, but participants may also take the prototype into use, the way it is supposed to be taken into use. In the design session, we thus see that at some point, P is asked to put on the shirt in order to demonstrate its functions to the newly arrived fourth participant, C. In Excerpt 6, the prototype is represented by two artefacts: The shirt itself and the computer, by which feedback is given. The demonstrator P, by fixing her gaze on the computer and by her verbal 'kijk' *look*, can be understood as establishing the computer as the relevant focus (l.1). Ps gaze is on the computer throughout the excerpt, and apart from glances from C (l.2 and l. 6) as well as A (l.2) towards P, gazes are on the computer screen.

01	P:	*n kijk nd look RarmP {moves stretched up gazeP >computer gazeA >computer gazeB >computer gazeC >computer
02	(1.2)	RarmP stretches up over head/short stretch beyond shoulder gazeP >armpit section gazeA >computer>Psarm >computer gazeB >computer gazeC >Psarm >computer
03	P:	want because RarmP moves down gazeall >computer
04	(0.3)	RarmP moves down - rest on table handsP holds armpit section--- gazeall >computer
05	(0.7)	LarmP moves up stretch to about eye level gazeall >computer
06	(0.8) ((total elapsed time 1.8)	LarmP lowers slightly RhandP {touches upper left arm gazeP >computer gazeA >computer gazeB >computer gazeC >computer>P
07	P:	hij moet dus it ought to RhandP moves tiwards wrist of stretched left arm gazeP >computer gazeA >computer gazeB >computer gazeC >P>computer
08	(0.9)	RarmP stretches parallell to stretched left arm gazeall >computer
09	P:	rood worden toch become red right RhandP moves toward elbow of left arm gazeall >computer
10	(0.4)	gazeall >computer
11	A	ah ja ah yes

Excerpt 6

The participants thus mainly focus on what the computer does in relation to the movements that P makes.

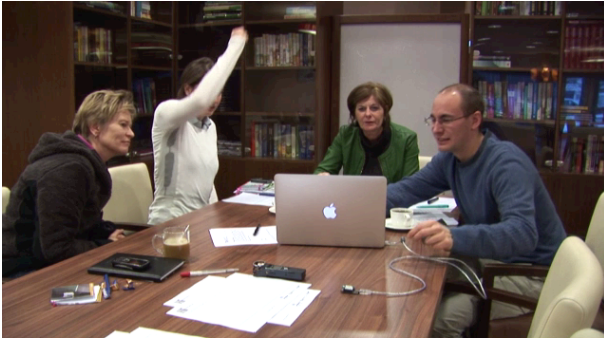


Fig. 6: Demonstrating the prototype, Excerpt 6, l. 2

In making her movements, P demonstrates here, that the sensors of the shirt may not be sensitive enough. This is an insight that P bases on earlier experience with the shirt, a point that she has made earlier in the session (Excerpt 4). In Excerpt 4 however, her manipulation with the prototype (touching the sensors at the armpit and stretching them) only illustrates her assertion. Other participants have to take for granted, that a large stretch has to be made in order for the sensors to register it. In excerpt 6, the assertion is substantiated with a demonstration, through which the other participants get direct experience, which provides convincing evidence for the assertion. In that sense, the version of the assertion in Excerpt 4 was a claim, while in Excerpt 6, it was done as a demonstration (Sacks 1992, Fall 1965, lecture 3, p 146-7). Demonstrating the prototype, and thereby providing evidence for design issues, can be seen as making the insight *recognizable* for other participants, through experiences, that they not necessarily had beforehand.

THE LOCATION OF THE PROTOTYPE AND HOW IT CAN BE HANDLED

Depending on what kind of object a prototype is, and what it does, it can be employed in different ways and thereby show specific issues to others. P could only *illustrate* (specifying the sensors) what she was talking about when making her point in Excerpt 4, while she could *demonstrate* her point in Excerpt 6. The difference was having the shirt lying on the table, or having it on her body. Initially one could claim, that wearing the shirt would give the participants better opportunities for proving their points, and discovering new issues too, as in Excerpt 5.

This does, however, depend on what kind of assertion is being made, and to what extend

different participants have access to those features of the prototype, which are in focus. In the following Excerpt 7, A makes a remark about the sensors in the back that should be placed lower.

- | | | | |
|----|--------|---|-------------|
| 01 | A: | en wat hadden we daar nou | |
| | | and what did we again | |
| | gazeA | >C----- | |
| 02 | A: | we hebben het daar wel es over ge{had hè | |
| | | we did talk about this one time right | |
| | gazeA | >B----- | {Psback |
| | torsoA | | {leans back |
| 03 | A: | wat hadden we daar nou voor (.) bedacht?.ff | |
| | | what did we come up with for that again? | |
| | gazeA | >Ps back | |
| | armA | lifts over back of chairs | |
| 04 | A: | dat ie eh | |
| | | that it eh | |
| | gazeA | >Ps back | |
| 05 | | (1.7) | |
| | gazeA | >Ps back | |
| 06 | A: | dat | |
| | | that | |
| | gazeA | >Ps back | |
| 07 | | (0.4) | |
| | gazeA | >Ps back | |
| 08 | A: | dat dat shirt eh | |
| | | that that shirt eh | |
| | gazeA | >Ps back | |
| | gazeC | >A | |
| 09 | A: | dat {die sensoren | |
| | | that those sensors | |
| | gazeA | >Ps back | |
| | LhandA | moves over Ps back downwards | |
| | headC | lift>ALhand | |
| | gazeC | follows ALhand | |
| | torsoC | moving back in order to see ALhand | |
| 10 | A: | .mff | |
| 11 | A: | eigenlijk lager moesten be{ginnen he | |
| | | actually should start lower right | |
| | gazeA | >Ps back----- | {>B |
| | LhandA | rests on Ps lower back | |
| | gazeC | ALhand | |
| 12 | B: | ja (.) klopt | |
| | | yes that's right | |

Excerpt 7

A indicates the location of the sensors she is talking about by stroking her hand over them (l 8). But since P is wearing the shirt, A has to rearrange her body towards her, in order to actually see and touch the right place. C, sitting in a 45 degree angle of P and A, also adjusts her body in order to follow A's hand and view the sensors (l. 9-11).



Fig. 7: 'Those sensors' l. 8, Excerpt 7



Fig. 8: Actually lower, l. 10 Excerpt 7

Again, we see that when a speaker directs her gaze and hands towards the prototype, other participants will gaze in the same direction. The other two participants however, do not gaze at the sensors. B, who sits in front of P, would have to stand up and walk to the other side of the table in order to see, and P, wearing the shirt, would have to take it off. A's hand movements are out of her sight, and A does not seem to directly touch the shirt, so P does not feel her gestures either. Hence, in this case, the participants do not have *mutual* gaze on the features talked about.

We see thus, that while taking a prototype into use may give stronger evidence for points made, in this case, it also has limitations: Since the prototype is 'in use', it can only be manipulated as an attribute to P's body, which makes it less flexible, even though there may also be advantages to have it on someone's body. The prototype on the table was to a higher degree accessible for manipulation and gaze by all participants.

IMITATING THE MANIPULATION OR USE OF THE PROTOTYPE BY GESTURE

Participants, as noted in the above have techniques for establishing joint attention to some object or person. In a design session, this is not always the prototype. We saw already that in Excerpt 6 the participants mostly looked at the computer, but also had some glances at P wearing the prototype. Also in Excerpt 3, P went from manipulating the

prototype to making a gesture at her throat, while, just before and during, she sought the gaze of the other participants. And in excerpt 4, P shifts from having her hands on the prototype, to making a movement with her body in order to exemplify the movement a user will have to make in order for the sensor of the shirt to react. In both cases, her recipients move their gaze from the prototype towards what P is doing with her movements. Interestingly, the movement in Excerpt 4, l. 9-11 is understandable as a meaningful movement only in relation to P *having the shirt on*. In order to make sense of the movement, recipients need to take the prototype and its functions into account - one could say that they in a sense have to imagine or map the prototype onto P's body in order to understand how it is meaningful. This is of course also supported by her talk. Significantly, P is drawing on her having had an earlier experience with the shirt - having the shirt on. This way of exploiting the prototype, manipulating or using it *as if it was there*, is reminiscent of Streeck's description of gestures that mimic manipulations of materials. As he asserts: 'As onlookers or interlocutors we apprehend these gestures as mimetic representations, turning, pulling, pushing things that are implicitly there.' p. 25 (Streeck, 2002). Using these types of gestures and movements means that the prototype can be exploited in the way that fits the participants best, even if it is in the wrong place for the purpose at hand. So, although the prototype is on the table, P shows how it works on the body. Now as we have shown in Excerpt 7, having the prototype on someone's body is not always the optimal position. In this case, establishing joint attention to the referent was not possible. In the next excerpt, a bit later than Excerpt 7, still talking about the sensors on the back, A communicates how the fabric of the prototype needs to stretch when you make a specific movement. Now in order to communicate this, A has a double problem: The shirt is not directly available for manipulation with her hands, and it is also not available for her to demonstrate it 'in use' since it is on P's body. A solves the problem like this: First, A makes a gesture, as if she is manipulating the fabric of the shirt on the back, holds her hand at the stretching position (l. 4):



Fig. 9: Manipulating the prototype as if it was there, I 4-5 Excerpt 8

Right after (1.5) A mimics the movement you'd have to make for the shirt to stretch like this by moving her torso forth and back, while keeping the hand in position, and finishing off with repeating the stretching motion:



Fig. 10: 'When you move' - I. 6 Excerpt 8

In a way then, A is simulating two imagined prototypes at the same time: One in her hands, which she manipulates, and one on her body, which she takes 'in use'. All the while, P is wearing the shirt.

By the gesture and movements A invokes the prototype and what you can do with it. The prototype can be understood as being invoked by way of the situational and chronological context in which the prototype also has been exploited manually and been demonstrated - in Streeck's words: 'the indexical, tactile grounds of the gestures figuration are available from the recent interaction' (Streeck, 2002), p. 37. Thus, A manages to both manipulate and demonstrate the prototype in order to talk about design issues - and she does it in a space where all participants have good possibilities to direct their gaze.

01	A:	dus eigenlijk moet die sensor	
		<i>so actually this sensor</i>	
	gazeA	>B-----	
	gazeB	>A-----	
	gazeC	>A-----	
	gazeP	>paper on table	
02	A:	zo laag mogelijk beginnen	
		<i>should start as low as possible</i>	
	gazeA	>B-----	
	gazeB	>A-----	
	gazeC	>A-----	
	gazeP	>paper on table	
03	(0.8)		
	handsA	brings in a position in front of her body	
04	(0.4) ((total elapsed time 1.2))		
	RhandA	starts stroking motion, palm out, upwards	
05	A:	het stuk daarboven (.)	
		<i>the piece above that</i>	
	RhandA	continues stroking motion, following a round curve ending with palm downward at about eye level	
06	A:	als je beweegt=	
		<i>when you move</i>	
	RhandA	keeps in position at about eye level	
	torsoA	forward movement	
07	A:	=dat dat pu-{dat het uitge (.) rekt wordt	
		<i>that that po- that this is being stretched</i>	
	torsoA	backward movement	
	RhandA	{stretching gesture	

Excerpt 8

CONCLUSION

Touching, pointing, holding, operating, employing, or even just gazing at a prototype while talking about the design are ways in which participants establish joint attention towards it. Thereby, assertions about the prototype may be substantiated. Furthermore, participants may get new insights about the prototype or ideas to develop it by viewing or handling it in a design session. In this way, prototypes may play a central role in design sessions. In this paper, three different techniques for explicating design issues by involving the prototype were identified: a. pointing and manipulating b. demonstrating the prototype's function and c. imitating manipulation and/or demonstration of the prototype through body movement and gesture. In the last technique, the prototype is not handled directly, but is imagined in the gestural movement, or mapped onto the speaker's hands and or body. Such gestural and bodily treatment of an imagined prototype may be even seen as more fruitful than actually taking it into use. It may, first of all, offer better opportunities for participants to have joint

attention to some issue, and, secondly, it may convey complex issues in one package, which would not have been possible to convey with the actual artefact.

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