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Published version

GLOCK, Friedrich (2009). Designing as Interpretation. In: Undisciplined! Design Research Society Conference 2008, Sheffield Hallam University, Sheffield, UK, 16-19 July 2008.

Designing as Interpretation

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Abstract

The paper suggests an interpretative approach to the empirical study of design processes. Design processes are conceived as social processes of interpretation and construction of meaning, and potentially of context generation. In contrast to models which conceive designing as a goal-directed process, an interpretative approach suggests a methodological reorientation. It assumes that design goals are more or less incomplete and vague at the beginning of a design process and are interpreted in contexts and in part are created by designers in the design process on the basis of their experience, embodied skills, and practices. The interpretative paradigm in design research seeks to observe, investigate, and describe practices that designers use in the process. Rather than attempting to determine and prescribe how practitioners ought to do their work, the research question is on how work is actually done - how interpretation is achieved by designers in particular design processes.

An extract is analysed in some detail in the paper. These data are taken from the transcript of a case study of a design process in practice. Sociological and socio-linguistic (‘sensitizing’) concepts such as frames and contexts are adopted to describe and analyze some practices observed in the episodes. The paper focuses on an aspect of designing – various forms of involvement and stances designers’ take on in the meaning making process of interpretative design work. Interpretative analysis takes into account designers’ alignments which constitute “participation frameworks” and ground designers’ multimodal practices in different media (language, drawing, gesture). Goffman’s (1981) concept of “footing” is used to reveal more subtle shifts in stances that designers take in designing. Investigation of referential practices designers use in some utterances in the observed design conversation suggests that designers step into, displace, and position themselves in transformed, “keyed” situations to experience the solicitations of design situations more directly and to take the role of others as well as the role of objects. These practices appear to be part of designers’ ability to construct meaning by establishing perspectives and getting “maximal grip” on design situations so as to exert their skills. Analysis of types of stances designers take in an observed design process, some of which addressed in the paper, may provide a way to describe an aspect of designers’ artistry and to characterize the particularities of unique design processes. The suggested approach is intended to contribute to a better theoretical understanding of designing and to the methodology of design research as an ‘epistemology of practice’. Interpretative analysis also aims to provide description of designers’ practices which may, as its practical benefits, contribute to ‘the reflective turn’ in design research.

Keywords
Design Research Methodology; Design Practices; Framing; Case Study

Most prescriptive design methodologies are based on "models of technical rationality" (Schön, 1983) which consider designing as technical problem solving, and as such, as an instrumental question about the means best suited to achieve predefined ends. Design research, in this view, strives to find general, context-free methods to determine the most efficient, rational way of solving a design problem. According to rational models designing is goal directed and consequently requirements specification, design goal detection, task analysis is prescribed as the first phase of a design process (e.g. Pahl & Beitz, 2006) which directs the search for adequate solutions (artifact, system, etc.) and the evaluation of solutions. Traditional logic, adopted by Polya's model of problem solving: analysis – synthesis – evaluation, functions as the methodological background (Gedenryd, 1998).

Since the 1970ties several empirical studies (using protocol analysis) of design activity have found that designers at work 'ill-behave' and deviate more or less from rational, normative models – for an overview see Cross (2006). Specification of design goal, for example, is often carried out throughout the design process and not only at the beginning. (Social) factors are taken into account to explain such deviation from normative models – which resonates to, what Bloor (1976) has called, 'sociology of error'. An interpretative approach, by contrast, conceives designing not merely to be influenced by social factors but as a social process (Bucciarelli 1994; Author 1998). Designers' experience has been found as an important 'factor influencing' design processes as well as its outcomes (Ehrlenspiel, 2006).

Interpretative Approach

An interpretative approach suggests a methodological reorientation (Joas, 1997). Rather than the execution of a (mental) plan, design activities or 'moves' (Schön & Wiggings, 1992; Goffman, 1981) are conceived to take their point of departure from designer's experiences, embodied skills, practices, routines, 'tacit knowledge' (Polanyi, 1966), etc., acquired through practicing and socialization into a 'community of practice'. Designers' 'knowing-in-action' (Schön, 1983) enables designing as a kind of skillful 'embodied coping' (Dreyfus, 2002; 2007). Rather than goal directed, designing is conceived as goal oriented. Design goals, of course, are of paramountcy for designing but can not be completely and precisely represented at the beginning of a process and remain more or less incomplete and vague. For design methodologies this problem is supposed to lie in inadequate methods and more sophisticated methods could remedy the problem. But this view of problems in requirements analysis preserves the idea of pre-existing requirements awaiting their detection.

Clients and users may have some 'needs' or 'wishes' but in contrast to the assumption that actual requirements pre-exist, the interpretative approach recognizes that users' needs are under-determined (Hollis, 1998). Users might discover, in using a designed artifact, what their 'needs' could be. Design work involves the creation of something new and, in this sense, resembles

artistic creation (Ferguson, 1992). Vague, incomplete, etc. design goals are interpreted and in part generated by the participants in the design process; and in designing artifacts designers simultaneously intervene in, or generate future contexts of production, assembly, etc., and the contexts of use – in designing an artifact designers also 'configure the user' (Woolgar, 1994; Author, 2003).

The focus of empirical design research shifts from idealized depictions of design methodologies to the **research question:** how interpretations in particular design processes are actually achieved by designers and participants; and the research task is to analyze and describe observable practices. Rather than „... preaching about how things should be done ... to see how they are in fact done" (Becker, 1996).

Designers at work rely on practices (such as skilled use of tools, media, etc.) and on background understandings which are taken for granted (Wynn, 1991) and as transparent means to the accomplishment of their work, at least in successful cases. Practices function only if they remain in the background and provide the conditions to pick out objects and to make sense. Designers at work are 'disattending from' their practices in 'attending to' (Polanyi, 1966) the artifact to be designed. The design researcher as an observer is not engaged in designing and attends to designers' practices.

Concepts: Contexts and Frameworks

Goffman has introduced Bateson's concept of contexts or frameworks to denote the ability of actors to interpret, make sense of 'what is going on', and 'define' situations.

When the individual in our western society recognizes a particular event, he tends ... to imply in his response (and in effect employ) one or more frameworks or schemata of interpretation of a kind that can be called primary. ... a primary framework is one that is seen as rendering what would otherwise be a meaningless aspect of the scene into something that is meaningful. (Goffman, 1986, p. 21).

Frameworks – primary frameworks as well as 'keyings' (cf. chap. 5) - organize experiences, provide perspectives, and impose some order or typification onto a situation. In frame analysis, behavior, including speech, is interpreted in the context of participants' current understandings of what frame(s) they are in. Participants are conceived to be situated within multiple frames or contexts which are capable of rapid and dynamic change. Goffman's (1981) related notion of "footing" (chap. 3) addresses the fluctuating and reflexive character of frames, together with the moment-by-moment reassessments and realignments which participants may make and the stances they take in moving from one frame to another. Descriptive design research in this view focuses on the dynamic unfolding of frames and contexts and attempts to describe the framing practices which are the background for interpretative design work. This paper focuses on an aspect - various forms of stance designers may take in designing. Since "change in footing is very commonly language-linked" (ibid., p. 128) sociolinguistic concepts will help to investigate types of stances. The suggested approach requires case study methodology,

ethnographic observations (video-recording) for a detailed analysis of how designers actually do design work.

On the Analysis of Designing – An Example

A case study of a design project in practice has been carried out in a research organization by the author. The goal of the observed project was to redesign the prototype of an `electronic epi-luminescence microscope' for small series production. The device is intended to replace the previous procedure for inspection of skin lesions in dermatology. It takes a digital picture of skin lesions to be magnified and displayed on a monitor as well as electronically stored and amenable to future image processing and computer aided diagnosing. Meanwhile the device – in a slightly different design - is on the market and in use all over the world.

The extract below is taken from an early design session. Two engineers (A and B, both experienced mechanical engineering designers) work together to design the mechanics of the device. A, who is charged with the design of the mechanics, has asked B for assistance in this session. The session has been video-recorded by the observer.

At the outset of the design session A and B are sitting next to each other on the table and address some requirements of the device such as `handy', `easy', `feel good in one's hands', etc., discussed elsewhere (Author 2001). A presents B (who is new in the project) a schematic drawing of the prototype and describes the functions of the device with reference to the drawing. We enter the session about four minutes after its beginning when A resumes their task of re-designing the device.

(extract 9:30:00 - 9:32:07)

A: *...des is nur a funktioneller Prototyp amoi und der is* (.) *so net verwendbar.* (.) *Jetzt* ((schließt die Mappe mit der Zeichnung)) *unser Augobe is, daß ma a Möglichkeit finden,* (1) *deshh.* (.) *jo. Sehr elegant hoit* ((lacht)) *wo einzubaun, die Optik. Die Optik, die Kamera, Polfilter und Beleichtung. Wort, i werd des irgendwie- i zeichn des amoi auf* ((geht zum flip chart))

… this is only a functional prototype and it is (.) in this form not usable. (.) Now ((closes the folder of the drawing)) our task is, that we find a possibility, tohh. (1) yeah. Just elegantly ((laughs)) to built in somewhere, the optics. The optics, the camera, polarization filter and lighting. Wait, I'll do this somehow- Wait ((points to flipchart)) I'll draw this at first ((goes to flip))

B: *host du net gsogt des soi mittels klane Motore verstöt werdn?*

Didn't you ((A returns)) say it should be adjusted by means of small motors?

A: *jo … daß elegant is. Wort, geht des do so? waunn i mi do so herstö?*

yes … ((goes to flipchart)) that it is elegant. Wait, is it ok that way? If I stand here?

B: Yes sure ((rearranges chair, orients to the flipchart))

A: *((zeichnet)) i hob amoi do (.) die (.) Prinzip her (.) des is die die Linse (.) die hot do drinnen glaub i (.) drei Linsen ((zeichnet)) Des kauf ma auba zua; des berührt uns weniger; wei des is a Tei*

((draws)) I have at first here (.) the (.) in principle (.) that's the the lens (.) it has in here I think (.) three lenses (.) but we will buy that; that doesn't bother us so much; because that is one part

B: *der Linsnsotz is fertig mit an Wort*

The set of lenses is complete in a word

A: *Den fertigen Linsensatz, jo, den kauf ma. den muaß I (.) vastön (.) in der Richtung(.) plus minus Nullkomma fünf (.) Millimeter=gaunz wenig*

The complete set of lenses, yes, we'll buy it. I have to (.) adjust it ((draws symbol)) (.) in this direction ((writes)) (.) plus minus zero point five millimeters=just a little ((gesture; see figure 1))

A: *... daunn hob i a Polfilter, der is do* ((zeichnet)) *den muß i um, plus minus neunzig Grad* ((zeigt mit der Hand)) *drahn.*

... then I have a polarization filter, which is here ((draws)) which I have, plus minus ninety degrees ((gesture; see figure 2)) to rotate

B: rotate, yes

A: *und do obn ((zeichnet)) hob i daunn (.) die Kamera des is ((schreibt)) (.) Kamera*

and up here ((draws)) I have then the camera that's ((writes)) camera

A: ... *do is de de Haut ((schreibt)) Haut. Und do do is des Melanom daunn, ...*

.... there is the the skin ((writes)) skin. And there there then is the melanoma... ((see figure 3))

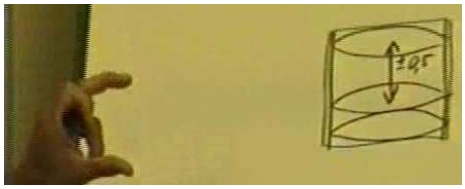

Figure 1

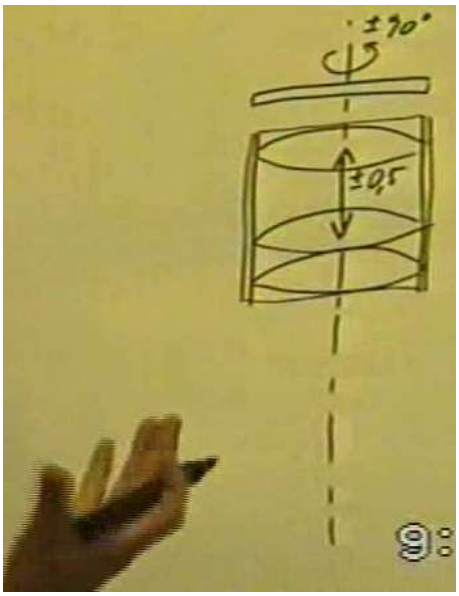

Figure 2

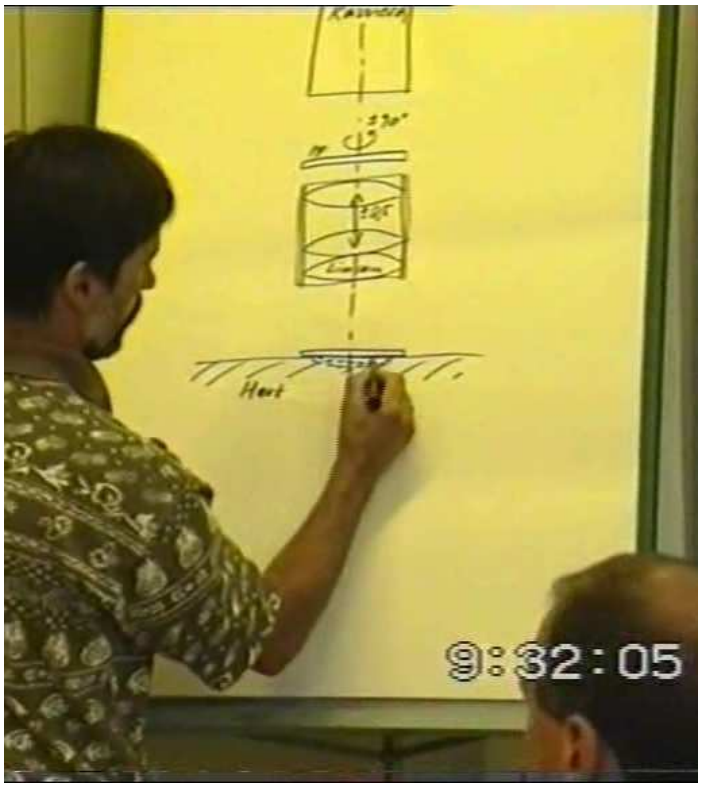

Figure 3

The extract begins as A sums up his description of the prototype with an assessment 'this is only a functional prototype and it is (.) in this form not usable'. For a discussion of post-positioned assessments as ways for speakers to display closure of an episode and to shift stance, see Goodwin and Goodwin (1992); critical assessments as ways to formulate indirectly - thus vague - design goals, see Author (2001; forthcoming).

A announces another episode - 'now', and frames what he wants to come to next, that is, to work on a 'task' together with B - 'our task is'. A describes the task "in one sentence" (Pahl and Beitz, 1984) - to 'find a possibility to ... build in (the components) somewhere', a rather vague formulation of a problem or design goal. In the same turn at talk, A makes a further announcement 'wait I'll draw this', that is, A frames (the type of) his upcoming activity.

Notice that in A's turn three frameworks can be discerned: the end of the description frame, the imposition of the 'task' framework and, within this framework, the framework or keying (see chap. 5) of 'drawing', each demonstrable announced – 'now', 'wait'. "(D)uring any moment of activity, an individual is likely to apply several frameworks" (Goffman, 1986, p. 25).

Participation Framework

As A announces 'I'll draw this', he stands up and goes to the flipchart and thereby indicates where he is going to draw (sheets of paper and a blackboard - which he will use later for sketching - are also available). B asks a question concerning a requirement - 'didn't you say…'. A returns to the table, reestablishing the previous arrangement and answers the question, then goes to the flipchart again. A's position at the flipchart initiates a change of the arrangement of their bodies in the session room which changes the local "participation framework" (Goodwin 2007). As A stands in front of the flipchart he asks – 'Wait, is it ok that way? If I stand here?' The marker 'wait' indicates the utterance is not to be understood within the announced type of activity – 'I'll draw this' – but in another, the primary frame or context in the session room. A assures that B has visual access to the flipchart. A's question implicitly also asks B to attend to the flipchart. B verbally acknowledges – 'Yes sure' , rearranges the chair he is sitting on, turns towards the flipchart, and gazes at it.

> *The participation framework constituted through the mutual alignment of the participants' bodies creates a dynamic frame that indexically grounds the talk and embodied action occurring within it. It also provides the basis for the … framework of joint attention, in which multiple actors are attending to the same object in the environment … (Goodwin, 2007, p. 57).*

The kind of participation framework thus created makes it possible for the participant to use indexical expressions in their utterances such as spatial adverbs whose meaning depend on context. Indexical language use is pervasive in the observed design session and can also be observed in episodes of other design conversations (e.g. between an architect and clients; see Glock, forthcoming). As A starts drawing he utters - 'I have at first here'; when he is drawing a rectangle he provides a clue to understand the drawing 'in principle'. When he has drawn a rectangle he utters - 'that's the the lens'; 'that' refers to the rectangle he just has drawn; A gives his colleague a clue for interpretation what the drawn rectangle is supposed to represent, namely an optical system. The rectangle is now seen as an optical system. A anaphorically refers to the optics 'it' and describes the optics - 'it has in here I think three lenses are these'; the epistemic marker 'I think' indicates that he does not know the optical system exactly. A sketches three convex lenses into the rectangle but this does not mean that the optical system will contain three convex lenses.

Since "applying a primary framework … (such as the task frame implies; FG) forming … expectations of what is likely to happen now" (Goffman, 1986, 38) B might expect that the optical system is to be designed in the session - 'but we will buy that'. The marker 'but' indicates a "denial of expectation" (Iten, 2000, pp. 176). The design of the optical system is not part of their task and outside of the task frame.

In his turn at talk A announces a component - 'I have at first here' (see chap. 5 for further analysis), designates the drawn rectangle - 'that's the lens', describes the optics - 'it has in here', announces a future transaction beyond the design session - 'but we will buy that', and calls the consequence for their design work - 'that doesn't bother us so much'. In each of the utterances A changes "footing, … (or) stance, or projected self. … The projection can be held across a strip of behaviour that is less long then a grammatical sentence" (Goffman, 1981, p. 128). The shifts in stances in A's utterances are also reflected in the use of deictic expressions - 'I', 'we', 'us' 'here', 'that'. The plural personal pronoun in 'we will buy that', for example, refers to the participants engaged in the larger project; in 'that doesn't bother us' the pronoun 'us' refers to A and B. The "shifts in alignment of speaker to hearer" (ibid., p. 127) is indicated by personal pronouns 'we', 'us' as well as the shift of the referent of 'that'.

B signals understanding and makes sure that the design of the optical system is not their task as he reformulates – 'the set of lenses is complete in a word'. A confirms in low voice – 'the complete set of lenses, yes, we'll buy it' and in normal voice he utters - 'I have to (.) adjust it'. The change of volume is a "sound marker" (Goffman, 1981, p. 127) which indicates change in footing as well as the personal pronoun 'I' does.

Vagueness in Design Conversation

A formulates a sub-task; the design of the mechanics for the adjustment of the optical system - 'I have to adjust it'. A gives the exact range of adjustment of the optical system 'plus minus zero point five millimeters' and adds - 'just a little'.

As A utters 'just a little' he simultaneously performs a gesture next to the drawing (see figure 1). The distance between his thumb and middle finger does not show the range of adjustment but he performs the adjustment; he appears to hold an imaginary optic between his fingers and moves his hand up and down – A 'adjust(s) it in this direction … just a little' (cf. chap. 5).

The exact formulation in formal, technical language of the requirement is reformulated into a vague goal expressed in everyday language. This appears to contradict recommendations of most design methods: to formulate design goals as clearly and exactly as possible. A proceeds contrarily. Analogous observations have been made in other design processes (cf. author, forthcoming). Similar findings in protocol studies have revealed "that designers' behaviour was characterised by their treating the given problems *as though* they were ill-defined problems, for example by changing the goals …, even when they could have been treated as well-defined…" (Cross, 2006, p. 78).

The vague, ambiguous, natural language term replaces the precise number and introduces "interpretative flexibility" (Pinch & Bijker, 1987, p. 40). This supports the idea that "(a)mbiguity is essential to design process …" (Bucciarelli, 1994, p. 178) and to conceive designing as interpretation. Just as with any indexical term the meaning of terms such as - 'just a little' - depend on context. The use of indexical, natural language requires contexts for understanding and may serve several functions.

> *(V)ague expressions may convey different meanings, compared to exact numbers. … Vague expressions are not just poor but good-enough substitutes for precise expressions, but are preferable to precise expressions because of their greater efficiency. …(They) may convey more relevant meaning than would a precise number. For example it may do a better job at conveying the lack of significance of a quantity itself. (In fact, it turns out later in the session that the range of adjustment might be – A: 'plus minus 1 millimeter but not more'; added by author) … The use of the vague quantifying might be maximally relevant in that it may yield more contextual assumptions than a precise number would. Speakers appear to exploit the inherent vagueness of these expressions for particular communicative purposes. … (T)he higher the degree of vagueness of the expression, the more emphasis seems to be put on the interpretive function of the quantifier. (Jucker, Smith, & Lüdge, 2003, p. 1755).*

The replacement of the exact number by the vague expression -'just a little' conveys a judgment and an interpretation of the range of adjustment and assumes a context; it also implicitly asks B to assume common ground for interpretation. Whether the range of adjustment - 'plus minus zero point five millimeters' is judged 'little' depends on context and might be different in mechanical engineering or, for example in the frame of fine mechanics. A's judgment expresses his stance, relates to his skills and competence as a mechanical engineer, and may (and will in the design process; not quoted in the extract) affect the type of solution they take into account.

The turn from considering precise, technical, formal language to the investigation of natural, more informal language in design conversation is to be reflected, I suggest, in design research that itself moves away from considering formal 'models of technical rationality' (Schön, 1983) to instead use interpretative methodologies. Vagueness in reference is often seen as a deviation from clarity–also in 'models of technical rationality' in design research. But "vagueness is not only an inherent feature of natural language but also— and crucially—it is an interactional strategy." (Jucker et al., 2003, p. 1739).

Multimodal Practices

A announces a further component - 'then I have a polarization filter' and as he draws a flat rectangle above the rectangle which represents the optical system he utters 'which is here'. The spatial adverb 'here' requires context for understanding; **'**here' is grounded in the established participation framework where he performs his drawing action. Together with A's drawing move his utterances 'I have … here', 'which is here' appear efficient; the required arrangement of the components relative to each other is not described in

cumbersome words but can be seen in the drawing; and, of course, the drawing is more durable compared to the volatility of spoken words. In comparison with spoken language visual representations use "distinctive characteristics of the material world to organize phenomena in ways that spoken language cannot …" (Goodwin, 1994, p. 611).

A points out a subtask or a design goal; as he says `which I have ... to rotate' he makes a gesture with his hand (figure 2); a similar structure as - `I have to adjust it…just a little ((gesture))' (figure 1). He »animates« the drawn object so as to simulate its intended behavior. Although A adds a symbol and a number, `±90°', to indicate twisting, the behavior of the object is not inscribed so much as it is performed.

Most sketches cannot be understood without additional annotations. Viewed as free-standing signs, these marks on paper are largely undecipherable. The same applies to verbal utterances and gestures: sketch, talk, and gestures in design work cannot be understood in isolation but the meanings mutually elaborate each other (Suchman & Trigg, 1993). "Such multimodal actions (are) … efficacious in large part because … (they) occur within an embodied participation framework that creates a visible, public locus for attention and action that includes both relevant structure in the environment and the actions and bodies of other participants" (Goodwin, 2007, p. 59).

Designing as "keying"

Without comment A routinely draws a vertical centerline. A centerline is conventionally drawn in technical drawings to indicate symmetry. It also indicates that the components are aligned on a common axis. The alignment of the components is not verbally stated but can be seen in the drawing. Actual components do not have a visible centerline.

A then draws a further rectangle which represents the mini video-camera; A writes `camera' into the rectangle. Notice that the written text is to be read or understood as an annotation and not, for example, as an inscription on the video-camera. For different marks on paper such as contours of components, texts, numbers, symbols, median lines, hatches, etc. different perspectives, frameworks, or readings are conventionally employed by the competent »reader« to understand an engineering drawing.

Unlike in an engineering drawing A also sketches `the skin' and `the melanoma' (see figure 3) which indicates the context of use of the device (some investigation of practices used in the reading of technical drawings, see author, 2001).

Complex components such as a video-camera, an optical system are transformed or translated into simple drawn rectangles. Things on paper are rather poor »copies« of the »originals« in that they cannot be smelled, have no color, cannot be touched, etc. But beside these restrictions, the transformation into drawings offers enormous new possibilities to handle the drawn things: they can be represented in proper scale (scaled up in the example), arranged in a way - e.g., positioned without support, aligned on a visible centerline - which would not be possible in real world, easily manipulated, "... structure can be drawn, composed, broken apart on paper... " (Latour 1990, 35). "A machine that has been drawn is like an ideal realization

of it, but in a material that costs little and is easier to handle than steel ..." (Booker, 1963, p. 187).

Designers, in a sense, do not act in a »real world« - engineering designers do not handle actual materials - but they operate within a transformed version of constructed representations in various media (drawings, words, etc.), or in "virtual worlds". "The situations ... are, in important ways, not the real thing." (Schön, 1983, p. 157). „(T)he officially attended activity - is itself a transformation of actual activity." (Goffman, 1986, p. 224). Goffman has introduced the concept of keying to refer "to the set of conventions by which a given activity, one already meaningful in terms of some primary framework, is transformed into something patterned on this activity but seen by the participants to be something quite else." (ibid., p. 43). There are numerous keying patterns like playing, fantasizing, describing retrospectively, analyzing, planning, modeling, testing, etc. and many of these can be observed and presumably have important roles in design processes.

Referential Practices

Reconsider the extract for another aspect of language use. As A starts drawing, he utters - 'I have at first here the'; when the sketch (of the optical system) is completed, he switches to an impersonal statement which verbally assigns meaning to the lines he has sketched – 'that's the the lens'. The utterance - 'I have ...', which refers to an 'I' is replaced by the impersonal referent 'that's'. Analogously - 'I have a polarization filter which is here', and 'up here I have the camera that's camera'. Notice in contrast that the personal pronoun referent in the utterance - 'is it ok … when I stand here?' (which is understood in the context of the session room) cannot equally be replaced. This seems to indicate that

> *(a)lthough certainly the pronoun, 'I', refers to the speaker, and although certainly the speaker is a specific biographical entity, that does not mean that the whole of this entity in all its facets is to be included on each occasion of its being cited. For he who is a speaker might be considered a whole set of somewhat different things … Thus, the referent of 'I' in the statements: … ('I have ... here', and 'is it ok … when I stay here?'; Author) shifts, although in no easily describable way (Goffman, 1986, p. 519).*

The ease of replacing the first 'I' in contrast to the practical impossibility of replacing the second 'I' argues strongly for there being a difference in referent or different facets of 'I' being cited.

Observe a further aspect of A's verbal utterances - 'I have … here the … lens', 'then I have a polarization filter', 'up here I have the camera', 'there is the skin'. A uses formulations containing personal pronouns only for components such as the optical system, the polarization filter, the camera, which are the subjects of his/their design. Indeed, it would sound rather odd if A would say for example »there I have the skin«; a dermatologist, by comparison, might say so. Thus, it appears that designers use utterance constructions with first or second personal pronoun referents for things they are going to work on or get involved with in their design.

Consider the formulations of requirements. In the previous discussion of requirements (not quoted in the extract) they formulated: the redesigned device `should be easy to handle, easy to assemble', etc. When B contributes to the discussion of requirements (see extract) he uses reported speech - `didn't you say it should be adjusted …'. When A has sketched the optical system he utters – `I have to adjust'; equally, the polarization filter - `I have to rotate'; later in the process (not quoted in the extract) B formulates a sub-task - `the polarization filter … you have to mount and guide it somehow; it has to be fixed into'; the ease of replacing `you have to' with `it has to be' again suggests that the referent of `you' is different from the referent in - `didn't you say'. The frequent use of compelling forms such as `I/You have to' in the observed design conversation (see extract) appears inappropriate in personal conversation between colleagues but adequate for the deterministic `object worlds' (Bucciarelli, 1994); this also indicates that the personal pronouns `I', `you', `we' refer to somewhat different entities than their personal identities.

Analytically, the actual situation in the session room – the `speech event' in which design conversation takes place – can be distinguished from the transformed, (sketched, reported, imagined, etc.) situations, keyings, or "virtual worlds" (Schön, 1983, pp. 157) the designers talk about. The first person singular pronoun `I' seems to have the property of "… bridging between the scene in which the talking occurs and the scene about which there is talking, for it refers both to a figure in a statement and to the currently present, live individual who is animating the utterance." (Goffman 1981, p. 150). The referent of `I' in `I have … here', `I have to' appears to refer to both, A the person in the session room and to a figure or an acting capacity in the transformed scene. "… a figure in a statement that is being told about, not in the world in which the current telling takes place." (ibid., p. 149).

A's utterances appear to imply that the referent of `I' is also located in the keyed situation drawn on paper - `I have … here'; similar utterance constructions can be observed recurrently in the session; later in the session, for example, when they design (a solution of) the mechanics A utters `here I can go out'. (not quoted in the extract).

In such constructions of designers' utterances the implied pronominal referents are located in and set in relation to the transformed situation of the drawing and seem to experience the design space from the position or perspective of the object (the mechanics to be designed); this is also where they look at and where their »work place« is. The indeterminate referents of `I', `you', we' used in utterances such as `I / you have to adjust / rotate' also seem to refer simultaneously to both the designers and the mechanics they are going to design. "These utterances thus seem to have a semantically schizoid, illogical character which blurs the boundaries between the animate subject …and the inanimate object (physical entity) … That is, the referent constructed in these utterances appears to be neither exclusively the … (designer; Author) nor the object of inquiry but rather a blended identity that blurs the distinction between the two" (Ochs, Gonzales, and Jacoby, 1996, pp. 340).

I suggest conceiving such constructions as referential practices, which enable the desiners to manifest an extreme form of subjectivity by stepping "into the situation, to make himself part of it" (Schön, 1983, p. 131). In the activity of designing the mechanics for the adjustment of the optical system, utterances

such as 'I have to adjust/rotate' expresses involvement more extremely by empathizing with, taking the perspective or "taking the role of the objects" to be designed. G.H. Mead (1934) has characterized the core process of social interaction as "taking the role of the other"; that is, actors refer to an (inferred or assumed) context to »design« their actions or utterances. Mead sees the core process of social interaction (as a quasi-dialog) also at work in human interaction with objects by actors "taking the role of the objects" (Mead, 1938). This view accords with the idea of designing as a social process.

Summary and Discussion

The investigation of an extract taken from a transcript of observed design process has demonstrated that designers simultaneously deploy multiple frames and rapidly change frames in design conversation. Frames provide schemata of interpretation to make sense of or to understand a situation which also implies a subjective involvement or stance in it. Rather than detached operators who apply some rules or methods on predefined, given situations, designers are subjectively involved in designing.

Some framing practices and forms of involvement have been described in the paper. Analysis has found that the setting of the workplace and the stance (quite literally) designers take as they arrange their bodies to each other in the environment create a participation framework. Such frameworks ground the use of indexical language and multimodal actions. Evidence has been put forward to support the idea of designing as interpretation: rather than directed by precise design goals, designers also use vague goals which require frames and contexts for (common) understanding. By formulating vague goals the designers in turn invoke these frames, contexts and assume a common background. Framing situations in such a way allows the designers to be able to respond to the solicitations of the situation. Central for designing appear framing practices through which situations are transformed into various keying patterns. Keyings such as transformations into drawings provide designers access to the situation and offers new possibilities to handle the drawn things. Investigation of referential practices has indicated that designers seem to step into and to position themselves in the transformed situations. Some referential practices have suggested that designers also seem to take on extreme forms of stances and to identify with the objects or to take the role of objects.

Designers appear to use framing practices - some of which I have attempted to describe in the paper – to get access to design situations, to take stances and to position themselves in, and to get 'maximal grip' on situations such as to exert their skills and to respond to the solicitations of the thus created situations.

Since the data (extract) is provided in the paper the validity of the presented interpretations can be reproduced or contested by the reader. Although the presented analysis is based on an extract (two minutes) of a design process the aspects of designing addressed by 'sensitizing concepts' such as frames and context, creation of participation frames, use of keying patterns, and referential practices in design conversation appear to be relevant concerns for every design process. Further aspects, of course, are crucial and further concepts might prove to be useful for interpretative investigation.

The suggested interpretative approach to design research intends to contribute to a better theoretical understanding of designing and to the methodology of design research as an `epistemology of practice'. The suggested approach is a way to "… observe, describe, and try to illuminate the things practitioners actually say and do …" (Schön 1991, p.5). Rather than striving to discover general rules, `laws', or empirical regularities in design processes an interpretative approach seeks to describe how designers achieve interpretations in the particular (observed) design processes; it attempts to be sensitive for the uniqueness of design processes. Interpretative analysis aims to describe the ways how designers or design teams proceed in particular design processes, for example, the sequence of stances they take in various episodes of the process. An interpretative approach therefore appears appropriate to contribute to the `reflective turn' (ibid.) in design research. The researchers' descriptions attempt to make designers' transparent practices `visible' as a kind of `mirror' to stimulate "reflection on the understandings already built into the skillful actions of everyday practice." (Schön 1991, p. 5). "Frame analysis may help practitioners to become aware of their tacit frames" (Schön 1983, p.311). Reflection on framing practices open up the possibility for `context learning' (Bateson, 1972), that is, a change of frameworks. And changes in framing practices will also result in a change or innovation of designed products.

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