THE IMAGINATIVE POWERS OF THE USERS' MIND
- from Visual Communication to Visual Interaction

Janni Nielsen
Copenhagen Business School
Department of Informatics
Howitzvej 60
DK 2000 Frederiksberg
Denmark
+ 45 3815 2417
janni.nielsen@cbs.dk

ABSTRACT

The paper presents different theoretical perspectives on visual communication all of which point towards design of IT-media. The authors represented come from communication studies, film and media analysis and architecture, but they all aim to contribute to a theoretical framework of digital design. The intention of the paper is to discuss the different theoretical perspectives and see how far they may take us towards - and to which extent it will be possible to contribute to - an interdisciplinary theoretical framework for design of interactive interfaces. The interface is visual and designed to communicate, but it is interaction that distinguishes digital interfaces from the more traditional media. It is argued that without the imaginative power of the user's mind, visual communication will not open for interaction. Hence, it is necessary to integrate a psychological theory into the interdisciplinary theoretical framework.

Keywords: interface, design, psychology, film and media, architecture,

1. INTRODUCTION

Visual communication is the domain of creative disciplines such as media, drama, graphic design and film making, but it is also an essential foundation for the design of interfaces. This is seen very clearly in web-design, and in administrative systems the international development within the IT-industry indicates that design of usable and aesthetic interfaces is becoming a competitive advantage.[1]

Within the professional community, the design teams are interdisciplinary and each member brings his/her own tools and techniques to the work. Within research, different academic traditions have their own perspective and vocabulary through which the field is conceptualised and understood. The technological developments have led to new interdisciplinary approaches to interface design. However, the developments have yet to establish a truly interdisciplinary foundation. Because the field is still new, we all, sensibly enough, draw on what we already know and master.

In the following, different theoretical perspectives on visual communication will be presented. The authors who come from

---

[1] Navision – personal communication

1

communication studies, film and media analysis and architecture have been chosen because they all aim to contribute to a theoretical framework for interface design. The intention of the paper is to discuss these different theoretical perspectives and see how far they may take us towards - and to which extent it will be possible to contribute to - an interdisciplinary theoretical framework for human-computer interaction.

2. VISUAL COMMUNICATION

The main function of visual communication is to express the designer's intention in the communicative message, catching and maintaining the spectator's attention, imagination and cognitive emotion. The addresser – or designer's intention and the way it is expressed in the message are in focus. The issues are information and facts, but also communication of attitudes and emotions. Communication is also about the addressee's reception of the message, the way the addressee interprets the text, the image, the film or the interface[2].

Visual communication is equally fundamental for digital design, although only few theories have developed a model for visual communication of interactive interfaces. However, Thorlacius` theoretical work (2001, 2002) on the visual and aesthetic aspects of communication offers an approach to analysis and design of visual communication of web sites. The author takes her point of departure in the discussion of language functions in the classical communication theory of Roman Jakobson (1960), which she uses to develop and radically rethink the theoretical conceptual framework to contribute to a theory of visual communication.

---

[2] Communication is also about context, code, medium, etc. However, for the purpose of this paper, a very simple model is sufficient

Thorlacius takes the designer's perspective and focuses on design – visual communication. But the conceptual model that she develops embeds both sides of communication: the designer – the interface design - and the user. To understand visual communication, Thorlacius suggests making a distinction between the expressive function, the emotive function and the aesthetic function. *The* expressive function relates exclusively to the addresser. It is the designer who creates the expressions. *The emotive function*, on the other hand, is ascribed to both the addresser and addressee (the user) and is differentiated: the designer may possess/may not possess expressions of emotions that s/he evokes in the user, or the designer may unintentionally evoke expressions of emotions in the user. The last function deals with the aesthetic aspect, which is the focus of the author's analysis. It is differentiated into aspects that may be expressible and inexpressible aesthetic aspects, the origin of which is ascribed to senses and feelings. Thorlacius defines the latter as the ability of visual language to communicate that, which cannot be classified. Thorlacius focuses on the image, but her understanding of the inexpressible aspects also relates to a user perspective. It is a mutual experience of inexpressibility. It is the designer's experience of being unable to verbalise explicitly what s/he has expressed (in the design). But it is also the user's experience of being unable to express what s/he perceives.

2.1 Dynamic Graphics and Interaction

Thorlacius´ paper is written from a designer and design perspective. However, the text embeds a perception of the human being on the other side of the screen: the user who perceives and reacts emotionally to the design. Although the perspective is not part of the author's focus, the model opens the way

for an in depth analysis of the emotive and aesthetic expressions. It suggests a differentiation where the emotive function offers a handle with which to approach the psychological understanding of the user. However, it is not possible within the model to capture the individually perceived inexpressibility or rather the user's perception of the in-expressible where the user brings her/is subjective experiences, attitudes, emotions, etc. to the interpretation of the visual communication.

The interface is visual and designed to communicate. Thorlacius' theoretical contribution is a first step in the direction of a model for analysis of interfaces. But the interface is also designed to enhance users' interaction with the computer, and it is interaction that distinguishes it-interfaces from the more traditional media. The next step is to search for a theoretical perspective that will contribute to an understanding of the interaction. I shall return to the issue. At this point, I want to pursue another aspect of visual communication pertaining to mental interaction that needs to be integrated into an interdisciplinary theoretical frame. Interaction is dynamic and the interface may be characterised as visual, dynamic graphics (Nielsen, Janni 1990), because visually communicating interfaces are dynamic and not static. Objects on the screen move, new objects emerge, text windows appear, clicking on objects lead to new digital pages or to animation, etc. Turning to filmmaking, the creation of dynamic pictures may take us a step further in our search for a theoretical frame.

3. FROM LIVING PICTURES TO MEDIA GAMES

Filmmaking has a long tradition in visual communication, but works with other tools than traditional graphic design because a film consists of "living pictures" not a static image. In his article: Interacting with Pictures: film, narrative and interaction, Steven Boyd Davis (2002) discusses the knowledge he gained in filmmaking and how it may benefit design of interactive media games. He takes the filmmaker's perspective focusing on the making of an imagined vision. He reminds us that film is essentially pictorial. It is not showing, but constructing an aspect of vision that the film-viewer needs to make sense of the film. The filmmaker does so by offering, "fragmentary evidence, organised with a view to affording certain assumptions and interpretations, and the film-viewer (partly on the basis of shared conventions) duly makes those interpretations".

The tools employed in creating the fragmentary evidence include the shot, the camera view, the information and the affective expressivity as well as the contextualisation of the shot. These tools are brought together in the editing, and the author states that the contextual information of a shot provides the "psychologically necessary" aspect. From here, Davis turns to interactive media games and suggests that it may be fruitful to evaluate them within the same framework: as essentially pictorial. He argues that ideally the design should make users "believe that they are interactive observers of a world". Davis points out that one of the problems is the constraint spatiality in interactive media and suggests exploring the issue by focusing on the "make believe", which can be found in *the* "spatial maturity" in filmmaking. The essence is "psychological immersion" where the visual images enhance the viewer's feeling of being psychologically immersed.

3.1 Fragmentary evidence and the interactive observer

Into the concept of visual communication, Davis introduces the role of the tools and techniques in the production of living pictures and allows us to move beyond the design and analysis of the static image into the realm of dynamic images. Filmmaking offers us a frame for understanding the visual communication of graphic interfaces. Davis also points to essential dimensions in the viewing of the filmmaker's imagined vision; the fragmentary evidence that provides the psychologically necessary aspect. In this way, Davis establishes a relation between the filmmaker and the viewer; an accordance with the filmmaker's fragmentary evidences and the viewer's assumptions and interpretations of these. And here the viewer becomes - in Davis' words - an interactive observer. Hence, Davis ascribes an active role to the viewer in creating understanding and sense-making, and he understands the process as interpretations made on the basis of shared, cultural conventions.

However, we need a way into the analysis of visual, dynamic communication, and Thorlacius' theoretical model allows us to discuss the designer's intentions and the relationship to the viewers/users' sense making. Thorlacius' distinction between the expressive and the emotive functions that the designer may/may not possess and may in/or/unintentionally evoke in the user indicate the psychological forces at work. It may help us capture the conscious intention and the unconscious emotive forces in the designer's mind if the analysis integrates the intentional and expressible aspects in the aesthetics of the visual dynamic images, including the unintentional but expressed elements within the fragmentary evidence. But Thorlacius' conceptual framework also provides us with an approach to the user's sense-making, including the elements that are unrelated to the designer's intentions. This opens a way for an understanding of the user as a psychological individual, bringing subjective assumptions and interpretations into the interaction.

3.2 Immersion in a make-believe world

Having gained access to is not the same as being able to carry out an in depth analysis of the psychological processes at work in the user. Here, Davis takes us one step further in our analysis of the user's experience of the design. He points to the importance of the psychological immersion - the feeling of being in a make-believe world, again giving ample room to the film viewers' psychological make up. The author argues that the feeling of being psychologically immersed is created through the spatial design competence of filmmaking and suggests that we draw on film when designing for immersion in virtual spaces.

The feeling of psychological immersion must not be disregarded. In film, as in media games, the feeling of being up there on the screen moving around with the characters, living with them, is essential. However, I will argue that in film viewing, the descending darkness, the sound that surrounds us, the large screen and as a consequence the others, the audience who disappears, also play a critical role in the immersion.

Drawing on filmmaking poses limitations. The audience is regarded as observers, and their interaction is limited to making assumptions and interpretations according to the filmmaker's intention. They have no influence on the unfolding story, they cannot change its course, move objects around, change the setting, etc. The interaction that IT-media systems require is missing. A

prerequisite for this interaction is interpretations and assumptions, and in this respect the mental processes are the same as in film viewing. But the interaction also requires participation. The user must become an interactive participant, bringing her/is individual, psychological powers of thought to the relation. Hence, interactive design makes room for a story to unfold - and it is through the individual's psychological powers, decision making and action taking that the story is told. I shall return to the issue, but first I want to look at spatial design and how it may enhance psychological immersion. I suggest that we turn to architecture – the making of spaces.

4. EMBODIED SPACES

Andreas Lueschers´ perspective is architecture and educational models (design representations). He discusses image representations (in architecture, theatre, paintings, sculptures, etc) of three or more dimensions of information on two-dimensional display surfaces and the simulation of a full spatial experience with horizontal, vertical and temporal extensions. Luescher presents historical evidence of visualization techniques where environmental representation embeds "sensual engagement, material exploration, and a connection with the real" (Luescher 2002). Such a representation involves a synthesis of touch, sound and movement, an experience that results in bodily, sensual, emotional and intellectual understandings. One such representation is the panorama in paintings, the experience of which is "qualitatively different from looking at a picture isolated within a frame. …… The panorama made it necessary to move not only one's eyes and head, but also one's body in order to assimilate the vast continuous picture" (ibid). The history of visualization also becomes the history of immersion in the image and of

embodied, perceptual experience technologies. Luescher points out that the same development takes place in architectural design courses where experiments with representations turn experiences into bodily, sensuous, time and spatial constructions. The process involves letting students make constructions in 1:1 scale in solid materials instead of just letting them draw in 1:10 on 2-d paper.

4.1 The perceptual experience of an actor

With Luescher, the representations become solid and not just visual. The architectural concept of visual communication as embodied spaces that require immersion takes the visual communication out of the spectator or observer perspective and moves it into the actor's perspective. When an actor interacts with physical material, it may result in bodily, sensual, emotional and intellectual understandings. Luescher gives us an understanding of the essence of physical immersion in architectural prototypes – by bodily moving into them. But he also gives us an understanding of physical immersion in panoramic paintings when he speaks of immersion in images – by bodily moving along the painting. To Luescher, this is exactly the limitation of the computer. He questions the claimed revolutionary potential of the computer in terms of imaging and the promise of immersion. He points out that computer representations remain screen-bound, small-scale and impenetrable treating constructions as drawings. Hence, a student of architecture engaged in a computer based design course will never be able to experience a bodily, sensuous, emotional and intellectual understanding of space.

Clearly, this raises the question of what happens when we interact with virtual material in virtual spaces. Here, the interaction will be mental – interacting with a

computer implies moving into spaces that are not tangible, spaces that we cannot touch or smell. On the contrary, this is a mental process involving senses, emotions, body and thoughts. How can we understand the psychological processes involved in the immersion and how can we conceptualise embodied experience in the construction of visual, spatial representations? Is it possible to talk in a meaningful way of the embodied immersion in visual, spatial representations – embodiment that is mental?

4.2 Psychological immersion in the interface

Luescher questions the immersion when images are screen-bound, small and impenetrable. However, Davis' approach to filmmaking indicates that psychological immersion is not only a question of the size of the screen or the body moving along or into sensing and feeling, etc. Immersion is also a question of the design of the representation – the way it is communicated – the extent to which the designer succeeds in offering fragmentary evidence that allows the user to make interpretations and - and this is essential - entices the user to act, to interact with the interface. Yet, it cannot be physical immersion. It is true that screen bound interfaces do not offer physical immersion, although the space is visual like in paintings. But a screen is not a picture in a frame. The picture that we see on the screen is a representation of the underlying software program and it requires an actor. Besides, the computer interface offers something different and additional – it offers interaction that may open for the mental exploration of representations. Just think of interactive adventure games. They require participation of the user – psychological involvement, and they may result in bodily, sensual, emotional and intellectual understandings, even an

experience of bodily and psychological immersion.

5. STEPS TO A THEORETICAL FRAME FOR INTERFACE DESIGN

The presentation of all the different perspectives contributes to the interdisciplinary framework for analysis and design of interfaces. Thorlacius takes the designer's perspective and her focus is the design, the visual communication. Her theoretical frame gives us access to in depth analysis of the expressive, emotive and aesthetic functions of the visual communication. The conceptual model also points towards users' perceptions of designers' intentions – embedded in the expressive, emotive and aesthetic functions. But within the model, it is not possible to capture the individual user and the cognitive qualifications that s/he brings into play. As the user, interfaces are dynamic, interactive and constitutive factors in the interaction, which distinguishes media games, database interfaces and web sites from traditional media. Thorlacius' conceptual frame clearly leaves room for unfolding this aspect. However, it has not been the focus of her work.

Davis takes us into living pictures and media games and reminds us of the tools and techniques employed in the design of visual communication. His discussion of how the designers' organisation of fragmentary evidence affords the assumptions and interpretations that the user duly makes (due to shared cultural world), including his concept of the participant observer, open for further analysis of the psychological – or mental – process of the user.

Davis suggests that to become a participant observer requires psychological immersion in the spatial design. With this argument, he

points to an essential aspect of visual communication in filmmaking. However, in the world of games, it is not sufficient to observe, participate in sense making and feel immersed. The user is required to act, to engage in mental visual interactions, and the observer becomes an active user and contributor to the interaction. As a consequence, an understanding of the user as actor and as interacting with the dynamic interface (which is the representation of the program that the user sees) becomes essential for the interdisciplinary theoretical framework.

Turning to architecture, Luescher offers us the actor – and interaction with the material s/he is working with. His perspective is the creation of spaces and the experience of spaces. He understands spaces as embodied perceptual experiences where the architectural design invites physical immersion in terms of body and senses, including emotions and intellect. With his discussion of the panoramic painting, which requires the eyes to move around in the painting and the body to move along the painting, he opens for an understanding of the mental immersion, the mental interaction – in physical spaces. Yet, he maintains that it is primarily physical immersion – but how can it be separated from the psychological immersion in the image? Physical interaction – as the body moves alongside a painting or into a man size architectural construction - is also a mental (psychological) interaction. The construction is a simulation, not the real thing, which requires the creative powers of the human mind; to imagine the experience of moving around in an imagined space while moving in its simulation. This is one of the incredible forces of human life. We are constantly engaged in sense-making whether we interact with people, watch a movie, surf on the net or use an administrative program. It is the

imaginative powers of the mind that are at play here, and although Luescher does not focus on and explicitly discuss this issue, his understanding of immersion in the image opens for an understanding of visual interaction. In the following, a psychological model of human perception and sense giving is introduced in order to contribute to the interdisciplinary theoretical framework.

6. THE IMAGINATIVE POWERS OF THE MIND

Michael Polanyi (1968) understands visual perception as a way of seeing reality in gestalts. He argues that knowledge fundamentally rests upon indeterminacy in content, the connections we see and the data upon which we base our results. He suggests that different forms of insight exist and that "explanations must be understood as a particular form of insight" (Polanyi, 1968, p 30). This implies that there are other forms of insights, and he is especially interested in these other forms, the tacit psychological forms. He introduces these undefinable insights through his concepts of tacit inference and tacit knowledge and shows that "we know more than we can say" (Polanyi, 1968, p 30). This is because knowing is based on "indefinable powers of thought" (ibid p. 27).

We may approach these indefinable powers by introducing Polanyi's differentiation between focal awareness and subsidiary awareness. One can be consciously aware and focus on something specific; this is focal awareness. At the same time, other factors in the borderline of one's conscious awareness are interacting and supporting the focal awareness. This is the subsidiary awareness. He discusses these concepts by drawing on everyday life giving examples on visual perception, body perception and perception of language.

6.1 Perception

Polanyi understands perception as the essence of tacit inference and tacit knowing, and as such it is beyond language. He explains it as a psychological process that establishes an observation of external facts "without formal argument and even without explicitly stating the results." (p. 29). The first example is language perception, e.g. reading a text. The focal awareness in reading a text is not on each letter or each word, nor on the sentence. They function as subsidiaries for what we are focusing on: the meaning that lies outside us. The functional aspect of subsidiaries (letters, words, sentences, etc.) bears on the focus of our attention, and through the act of a person, the knower "who integrates one to the other", the subsidiaries become related to a focus. This integration is an (unconscious) tacit inference where the knower "sees" coherence where there is no coherence. It is a tacit act of a person and irreversible, as opposed to explicit inference (consciously intentional), which is reversible. Tacit inference is a process of integration – not deduction.
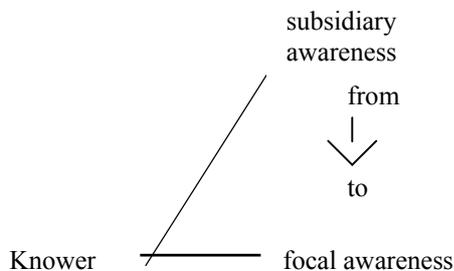
subsidiary
awareness

from

to

Knower   focal awareness

figure 1. The tacit triad (my illustration is developed from Polanyis' description). The two types of awareness are mutually exclusive and the knower can dissolve a triad by looking differently at the subsidiaries, e.g. letting them become the object of focal attention.

To explain the general structure of this process, Polanyi introduces: The tacit triad. To understand the triad better, let us turn to body perception. This will also help us understand the phenomenal aspects of from-to-knowing. Imagine that you are blindfolded and have to feel your way in the dark with the help of e.g. a stick. Polanyi argues that we do not focus on the feeling of the stick in our hand, which is subsidiary. Our attention is on the far end of the stick. Actually, we feel the point of the stick as it touches an obstacle in the dark. He calls this the phenomenal aspect of from-to knowing. In this case, it is a phenomenal transformation – arrived at by projecting our senses out into the world.

The third example deals with visual perception. Polanyi discusses what we see when we look through a stereoscope. You may want to try and use you hands as binoculars putting one hand before each eye. Close one eye and look, and you will see one image. In the next step, close the other eye, and you will see another image. The third step involves looking with both eyes through your "binoculars" – and a third image is seen, based on the differences between the two stereo images.

The two images function as subsidiaries to your view of the joint image, but your focus is not on the joint image, it is on the meaning of it. He argues that this is a typical structure of tacit knowing; a from-to-knowing – from the subsidiaries to the focal target, and the focal target is the meaning of the subsidiaries. He calls it an act of sense giving, which is the semantic aspect of from-to-knowing.

Hence, Polyani argues that we should acknowledge that:

- we can "see beyond established facts".

- we have the "capacity of feeling …subtle, virtually invisible, signs of reality".
- we have the power to "…know far more than we can tell" (p30).

6.2 Indwelling and Sense Giving

The basis of this process of perception is the human ability to extend our senses out into the world. The process of projecting ourselves out into the world is also described as "pouring one's body into" or interiorising it. To make "something function subsidiarily is to interiorise it, or else to pour one's body into it". (p. 33). Polanyi calls the ability to inhabit the artefacts around us for "indwelling". He considers this cognitive and emotive qualification as essential for the construction of knowledge and meaning. It should be noticed here that the focal target, which forms the meaning of the subsidiaries is placed some distance away from us. Our senses point into external space just as our actions are projected outward. Hence, the objects of our conscious attention lie predominantly outside us.[3]

The cognitive processes are tacit inferences, and in these inferences we see more than there is to see, establish coherence where there is no coherence and know more than we can tell, because we give sense – construct meaningfulness. The reason is that in the act of knowing, subsidiaries bear on focal awareness towards the focal target, meaning. But meaning lies outside us – in the integration of the subsidiaries (and remember the process is unconscious) into the focal target. The integration is tacit and as a consequence it cannot be talked about nor captured in verbalisations. In Polanyis' discussion, perception becomes a very complicated cognitive process and the essence is the act of sense-giving. It is the knower – the ordinary person – who in the act of giving sense comes to understand her/is world. Hence, knowing is not the same as verbalisation. On the contrary, it is much more than what we can verbalise and it is to a large extent inexpressible. Although you may be the knower who integrates into the act of sense giving, you do it on the basis of indwelling – this is the essence of knowing. It involves the imaginative powers of the mind.

7. VISUAL INTERACTION – discussion and reflections

In a design process, you move through many drafts and prototypes of the interface design. During this process, design elements come together in incidental and unplanned ways. Some of these "coming together" incidents may speak so clearly for themselves that the designer includes them in the design – without realizing that they have "constituted themselves". Hence, the design elements themselves may contribute to the unintentional, but expressible aspects that cannot be classified. However, my interest is a psychological frame that may enhance the understanding of the user. In this connection, the aesthetic function – the inexpressible aspect that the user perceives although it cannot be explicitly verbalised - becomes interesting. This step in the analysis of the visual communication takes us close to the psychological forces working in the subject. However, it stops short of interaction – and it is not able to explain the psychological subject or what the user brings to the understanding of visual communication.

---

[3] Polanyi reflects upon how "our own existence, which we experience, and the world that we observe are interwoven here. Bodily being, ……( ). ..becomes a being in the world, while external observations and projects subsidiarily involving one's own bodily feelings become, up to a point … an existential choice". (pp.33-34). He infers that applied to science – "the existential choices involve modifying the ground of scientific judgement".

Thorlacius is aware that designing digital interfaces differs from designing visual communication. It also includes designing interaction. It is interesting that when the author turns to the concept of interaction, she defines interaction from the user's point of view, but as physical, not cognitive interaction.[4] A web site e.g. requires that somebody starts interacting with it physically. Somebody has to enter the site address and somebody has to click on the mouse. However, it is a prerequisite that somebody interacts psychologically with the site, reads the screen, makes sense of the information, navigates, etc. Interaction with an interface is more mental than physical. It is not sufficient for a hand to click on the mouse to make communication work. The computer is a symbolic processing machine, presenting graphics on the screen that meet the eye and interact directly with our mind. Visual communication cannot be separated from mental interaction.

7.1 Fragmentary evidence and sense-making

Davis draws on techniques and methods used in the creation of the film media, and the relation to design of interactive games is clear. Here, it is possible to design the fragmentary evidence that affords assumptions and interpretations. It also seems to be a possible scenario for design of e.g. databases and graphic dynamic interfaces discussed at a general level. However, if the discussion focuses on interfaces in websites, the relation changes radically. Here, the user has to create the story. Each website is a world of its own. But, at the same time, a

website is, in principle, linked to all other websites. Even though the designer creates fragmentary evidence, it remains largely fragmented, because it cannot be organized to afford interpretations and assumptions – as the designer has no control over the web. It is the user who – through the creative powers of her/is mind - has to make sense out of the fragmented evidence. Following a link to a new link and again to another link, etc. – takes the user out of the designer's constructed world. It is the user who has to engage her/himself, and it is the user's understanding and perception that select and connect the fragments. Obviously, certain affordances may be designed within the contained world of a single web site, but there is no guarantee that the user will access the site as the designer intended or stay within the frame of a given site. Besides, the user's way into the web is in principle endless and fundamentally depends upon subjective criteria. Although many stories may be constructed a priori, no fragmentary evidence is guaranteed to afford certain assumptions and interpretations. Here, the user draws upon subjective knowledge and experiences creating an understanding that enables her/im to click and go on to a new page. The users provide the interpretations and make the assumptions – they cannot a priori be designed into the web – on the contrary. Hence, the user is not a participant observer, but an interactive actor and co-producer of visual communication and interaction – by seeing coherence where there is no coherence and by her/his meaning and sense making.

7.2 The psychological subject

Fragmentary evidence is organised to enhance certain assumptions and interpretations, and on this basis, we may look at the viewer as participating in creating understandings. Here, Davis indicates the psychological activity required, and as such he makes room for

---

[4] Thorlacius' interest is the designed interfaces and the visually communicating artefacts in the design. Hence, she is not concerned with the user perspective nor with visual communication as a mental process of interpretation –from a user's point of view (and one might say as a mental process of expression from a designer's point of view).

mental processes. But in traditional films, the viewer is an observer, because s/he has no influence on the story unfolding – the filmmaker has designed its course. However, it is the assumptions about the human mind embedded in Davis´ theory that I find interesting. Davis believes that a human being is able to make sense out of fragmented evidence. It is a general human competence of meaning construction (Bruner, Jerome 1990). Human beings live a life that is fragmented – seen from the outside. Fragmented information, fragmented interaction and fragmented communication fragment our actions, etc. However, seen from the inside of an individual human being, his/her life is coherent because of his/her ability to make sense. We are engaged in a constant process of sense making, seeing coherence where there is no coherence and constructing life as meaningful. Life becomes meaningful because we are not observers; we live life and understand it from an embodied point of view. We are immersed in life, whatever actions we engage in – we are not outside it. (Winograd Terry and Fernando Flores, 1984).

Fragmentary evidence only appears as fragments on the background of nothingness and the black holes between the fragments. Making sense of fragmentary evidence and the background is an active process, in which the elements must be constructed into coherent stories. Such a process requires mental immersion and not just observations. It is necessary to project our senses out into nothingness, fragments and incoherence. Hence, the meaning lies outside us and can only come into existence through an act of sense giving. Only by dwelling in may coherence come into being, and here the fragmentary evidence and the black holes function in the subsidiary awareness of our focus bearing down on our focal awareness. In a tacit process of from-to-knowing, the two

elements are connected to a whole, coherence is seen and sense is given. This is a psychological process. Just think of the process of surfing on the web, trying to find information that is not specified clearly – or think of reading and writing a paper with fragmented sentences, fragmented understandings and fragmented knowing, which the surfer or writer brings into mental interaction.

7.3 Immersion in virtual spaces

Davis argues that the user's experience of psychological immersion depends upon the representation of spatiality, which will induce users to believe that they are participant observers of the world. As such, make-believe offers a possibility for psychological immersion. Ideally, I (the film viewer) must feel that I am up on the movie screen living among the people, I must mentally project my senses, indeed myself on to the screen and move around in the filmic space. I must forget my physical body and project my self onto the screen – I must feel psychologically immersed and believe that I am a participant observer. In this way, we may understand how the participant observer engages in a mental process where s/he mentally connects the fragments into coherence.

But in interactive media, visual communication must also be understood in relation to interaction, the user's visual interaction with the media. Interaction is not just based on "make believe" where users think they are "interactive observers of the world". To some extent, we might say that there is no need for make believe in interactive media. The media requires that the user acts and interacts with the visual elements, changes, reconstructs or deconstructs, navigates into, moves on, leaves, etc.[5]

Here, immersion may be understood based on our ability to be in the world and to project our senses out into the world. Based on Polanyi, we may speak of our ability to pour our bodies into the visual, dynamic graphics unfolding before our very eyes. We are only able to make sense of images, interact with them and work with them through the extension of our senses into the visual representation. The process kind of involves moving from inside-out and from outside–in, through which an internalisation takes place; we become one with the sense-giving and meaning construction.

This mental process does not differ from immersion in spatial images represented in solid material. Moving bodies along and into – is also an embodied perceptual experience. It is a physical immersion that can only be experienced by projecting our bodies into something, and what we feel is not the man size world, but the place where our senses encounter the world. In a phenomenal transformation, we give sense to our perceptions. Luescher questions immersion in

two-dimensional screen bound interfaces as opposed to immersion in panoramic paintings where our eyes must move around in and our body move alongside the painting. However, immersion is not tied to and restricted by movement of the body. Besides, physical immersion in panoramic paintings cannot be separated from psychological immersion. As we move along the painting, our senses are assaulted by the traces left by the brush on the canvas, the colours in fat oily strokes, thousands of points, shapes, images, smell, etc.

Design is not just a question of offering fragmentary evidence that affords interpretations by the user. Interactive interfaces offer more than films and paintings. The space is visual as in paintings or films. But it offers fragmentary evidence that entices the user to act – to interact with the interface. It offers interaction that may open for exploration of representations, psychological involvement and result in bodily, sensual, emotional and intellectual understandings, even the experience of bodily and psychological immersion. And the activity becomes meaningful because the users are engaged in interaction and understand it from an embodied point of view. Users are immersed, also when they engage in actions such as interacting with an interface.

I will take the liberty to rephrase Lueschers´ statement into an entirely different claim: Computers offer representations, dynamic representations that embed possibilities of sensual, emotional and intellectual engagement, even possibilities of virtual exploration of materials and the electronic images and animations of designers' imagined vision. These representations require the user's participation, and the experience may enhance intellectual, sensual, emotional and even bodily understandings. However,

---

[5] Obviously, the user's control over the information, interface and interaction depends upon the specific system. For the purpose of a theoretical discussion on visual interaction, I work from an ideal model of users' ownership of information and control of the interface.

exploration of and experiments with the medium is necessary to develop a better understanding. The fundamental requirement is human participation, and the study of interaction with the symbolic representations may enhance our understanding of how computer-mediated representations in the interface interact with intellectual, sensual, emotional and bodily cognitive processes in virtual spaces.

ACKNOWLEDGEMENT

REFERENCES

Bruner, Jerome; Acts of Meaning, Harvard University Press, 1990.

Burke, Jeff: *Interactive performance environments and the visualization of actor movement*, Digital Creativity, February 2002.

Davis, Steven Boyd: *Interacting with Pictures: film, narrative and interaction*, Digital Creativity, February 2002

Jakobson, Roman; Linguistics and Poetics, in Thomas A. Sebeok (ed.) Style in Language, Cambridge, Mass, MIT press, 1960, pp. 350-377.

Keller, Evely Fox: *A feeling for the organism – the life and work of Barbara McClintock*, Simon & Shuster, N.Y.

Luescher, Andreas: *The Physical Trace,* Digital Creativity, February 2002.

Nielsen, Janni: The Role of Text and Dynamic Graphics in Knowledge Acquisition, in McDouglas A. and C. Dowling (eds.) Computers in Education, Elsevier Science Publ. IFIP, 1990, pp. 107-115 (8s).

Thorlacius, Lisbeth: Model til analyse af lexi-visuel, æstetisk kommunikation – med et særligt henblik på websites, Roskilde Universitetscenter, 2001.

Thorlacius ,Lisbeth: *A model of visual, aesthetic communication – focusing on web*, Digital Creativity, February 2002.

Winograd Terry and Fernando Flores*: Understanding Computer and Cognition*. Addison Wesley, 1987.