

Designing Mind-Based Media and Communications Technologies

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Summary

The paper addresses the question of the influence of form of information and technology used to deliver the information on the psychological effects of a single user of technology. First, information is divided into substance and form. Then the interaction of form of information and the technology carrying information is investigated. Personalization as the adaptation of the form of information is discussed as the basis of producing psychological effects at the level of the individual user of technology. Some key factors influencing psychological effects in technology, substance of information and form of information are identified. The integration of these key factors into entities which produce certain psychological effects is discussed as the production of significant form. To support the conception of significant form some empirical evidence related to key factors influencing psychological effects and the multimodality of perceptual processing are presented. Finally, the design rules for individualized psychological effects are presented as creating potentially new types of Mind-Based Media and Communications Technologies such as Knowledge Media, Emotion Media and Presence Media.

1. Introduction

Media and communications technologies carry with them information, which is symbolical, i.e. it represents the events of the world with symbols (O'Sullivan et al, 1994; Billmann, 1998; Schwartz, 1996). This information is produced by human beings, authors of symbolical information (McQuail, 1994; Altheide, 1985). When a receiver of information is interpreting the message sent, a complex set of interrelated

variables may influence his psychological states, such as presence, and subjective experience of the information, including learning, persuasion and emotion. These variables may be clustered as Mind (individual differences and social similarities of perceivers), Content (symbolical information and technology) and Context (social and physical context of reception) (Saari, 1998a; Saari, 1999; Saari 2000; Saari 2001). If one is able to know which types of variations of these variables produce which types of psychological effects, this information may be used when designing Mind-Based Media and Communications Technologies (Saari, 2001).

The study focuses on the interaction of Mind and Content; rather than on the role of Context. From this point of view, technology may be considered as consisting of hardware and software (Bradshaw, 1995; Rogers, 1986). Information embedded in technology may be seen as consisting of substance and form (Billmann, 1998). Substance refers to the core message of the information. Form implies aesthetic and expressive ways of organizing the substance, such as using different modalities and structures of information. (Saari, 2001). The influences of the author, technology used and substance and form of information on the psychological effects of the perceiver are in complex interaction as seen in Table 1.

Source of influence	Symbolical information Substance	Form
Author	Centralized organizations or individual authors may have certain ways of gathering, selecting and manipulating the substance of information.	There may be habitual ways of organization of information by centralized organizations or individual authors, creating certain ways of expression and aesthetic forms.
Device	Technological devices may partly influence the ways of gathering, selecting and manipulating the substance of information.	Technological devices have certain presentational and interactional properties which may interact with the available ways of organization of information, creating certain ways of expression and aesthetic forms.

Table 1. The sources of influence on psychological effects of symbolical information based on Saari (2001).

2. Personalization of Form of Symbolical Information

The emergence of real-time adaptation capacity of modern, computerized media and communications technology have brought about the possibility of personalization of symbolical information (Erickson, 1997; Riecken, 2000). This is based on variability which means that many potential versions of the same media product or a particular

collection of symbolical information may be available for different perceivers (Manovich, 2001). It means that symbolical information is no longer “fixed” into a certain mass-based format where everyone receives identical information, like in a newspaper.

For instance, news services have the technological possibility of being personalized, i.e. tuned to the needs and preferences of a certain individual (Saari, 1998a; Saari, 1998b; Saari, 1999, Saari, 2000; Saari, 2001; Turpeinen, 2000). One may discuss the ‘packaging’ of symbolical information, which means how the different dimensions of information are put together into a certain type of package, including form and substance. With personalization the packaging of symbolical information may be done in advance by the perceiver himself, as he chooses with the aid of software programs and filters the desired topics of his forthcoming information packages. These packages are automatically constructed through software filters at the time of perception, for instance.

With the possibility of real-time adaptation of symbolical information for different perceivers, one may focus more on the influence of the interaction of the technological device and form of symbolical information on psychological effects as seen in Table 1. It is hypothesized that one may vary the form of symbolical information within some limits per the same substance of information. For instance, the same substance can be expressed in different modalities, or with different ways of interaction with the user and technology. This may produce a certain psychological effect in some perceivers; or shade or amplify a certain effect, for instance. From this point of view Table 2 addresses the key variables which may influence psychological effects of symbolical information. It should be noted that these variables may be in complex interaction with each other.

Dimension	Factors influencing psychological effects
1. Hardware Type of media body	-Large or small vs. human scale (including the visual screen) -Mobile or immobile -Close or far from body (intimate-personal-social distance)
2. Software Ways of interaction via user interface	-Dialogical (lots of user control, lots of adaptive computer response, active exploration) -Narrative (lots of user control, little adaptive computer response, active exploration)
Visual and functional form of user interface	-Way of presenting controls in an interface visually and functionally -Blended with the form of symbolical information
Symbolical information A. Substance	-The essence of the event described -Type of substance (factual/imaginary; genre, other) -Ways of emphasizing explicit, literal meanings to describe events by authors -Ways of emphasizing less explicit meanings, such as symbols or archetypes or aesthetic devices such as narrative techniques to describe events by authors
B. Form Modalities (spatio-temporal)	-Text, video, audio, graphics, animation, etc.
Visual layout (spatial)	-Ways of presenting various shapes, colours, font types, groupings and other relationships or expressive properties of visual representations -Ways of integrating modalities into the user interface
Structure (temporal)	-Ways of presenting modalities, visual layout and other elements of form and their relationships over time -Linear and/or non-linear structure (sequential vs. parallel; narrative techniques, hypertextuality)

Table 2. Key factors in modern media and communications technologies influencing psychological effects of symbolical information based on Saari (2001).

3. Multimodal Significant Form

The study proposes that there may be a design space in which it is possible to create individualized packages of symbolical information via manipulating different variables inherent in modern media and communications technologies. When one focuses on the variables related to the form of symbolical information, one may speak of significant form (Carroll, 1999; Langer, 1957). Significant form implies an interaction of how different people perceive different forms embedded in media and communications technology and what types of psychological effects this interaction may produce (Saari, 2001). For instance, different modalities may influence psychological effects. To produce significant form in visual painting implies a certain way of arranging lines, colours, patterns and other elements of the painting to produce a psychological effect (Carroll, 1999). In music, certain forms may reflect certain emotions and consequently “produce” these emotions in the perceivers (Langer,

1957). In cinema, one may use montage as a way of expressing significant form and to create perceptual dissonance, or a critical attitude towards the film (Eisenstein, 1957). Television is visually with camera angles, points of view, narrative techniques, rhythm and other expressions of form which may influence psychological effects (Berger, 1997).

One key idea for significant form which influences psychological effects is the multimodality of sensation. It implies that different channels of perception and sensation such as hearing, sight and touch are partly mapped onto each other in complex ways to produce “higher level” sensations (Barry, 1997; Hunt, 1995; Cytowic, 1997; Crick, 1994). One example is a certain type of synesthesia, in which sound and sight seem to map on to each other in systematic ways (Marks, 2000). Accordingly, Eisenstein (1957) emphasizes the multimodal sensation of a work of art; as he sees the film can impact all senses. He suggests that even a printed text may contain the sense of touch, the sense of smell, light, hearing, movement and pure emotion. The ways of integrating multimodal elements together in a linear and sequential manner, such as cinema, may have significant psychological consequences. Similarly, Mitry (1963/2000) speaks of meaning units inherent in cinema. He refers to significant forms inherent in cinema which produce psychological effects.

4. Design Rules for Psychological Effects

From the point of view of empirical evidence of the philosophical ideas discussed in this study, there have been several results which support the possibility of designing for psychological effects. For instance, in experimental psychology it has been established that recognition and memory can be influenced or typically even enhanced by previous exposure to subliminal visual or auditory images of which the subjects are not consciously aware (Jacoby et al, 1992; Kihlström et al, 1992; Marcel, 1983; Roediger, 1990). In media studies it has been found that different modalities, such as visual and auditory, may lead to different kinds of psychological influences; and that there may be a mere exposure effect which may explain comfort with some stimuli; and further that the valence of a preceding subliminal stimulus influences the subsequent evaluation of a person evaluated (Cuperfain and Clarke, 1985; Zajonc, 1968; Krosnick et al, 1992). In educational studies it has been shown that different

ways of processing information influence learning and emotion of stimuli (Rayner and Riding, 1998). Research concerning emotional influences on the cognitive processing of information has often concentrated on how different emotions related to symbolical information change the way users pay attention to, evaluate and remember the mediated message. This research has results on the influence of emotional symbolical information as increasing the user's self-reported emotion (Lang, Newhagen and Reeves, 1996); attention (physiological and self-reported) (Lang, Dhillon and Dong, 1995) and memory for mediated messages, particularly arousing messages (Lang, 1990; Lang, Dhillon and Dong, 1995; Lang, Newhagen and Reeves, 1996).

It may then be that there are more or less explicit 'rules' when designing, for instance, a certain film utilizing cinematic techniques which apply to material representations, such as the form of symbolical information. Knowing the rules a capable film director is able to more or less directly "produce" psychological states in the perceivers. This same principle of the design of significant form in producing psychological effects on perceivers may also be utilized with modern media and communications technologies. For instance, if one wishes to produce more or less presence with certain form of symbolical information, one would have to know which types of variations of form may cause which types of qualities of presence for the different perceivers. The same principle may apply to other psychological effects, such as emotion, learning, persuasion or so. This is the basic principle of designing Mind-Based Media and Communications Technologies (Saari, 2001).

Regarding research concentrating on presence, one may study for instance how the form of symbolical information influences the degree of transparency and psychological immersion with the user and medium; the degree of perceptual realism of the medium and the dynamics and transportation aspect of presence (Lombard and Ditton, 2000; Biocca and Levy, 1995; Potter, 1986; Reeves and Nass, 1996).

In essence Mind-Based Media and Communications Technologies is a theoretical concept which may serve as a research agenda focusing empirical research to find the "design-rules" for producing certain types of psychological effects for specific applications. This type of research is Mind-Based because it takes into account the

individual differences and social similarities of perception of different segments of perceivers; and for example the variations of the form of symbolical information per segment; which in their interaction then may more or less systematically produce, amplify, or shade different psychological effects (Saari, 2001). One may then hypothesize of individualized information products, such as Knowledge Media (Saari, 1998a, Saari, 1998b; Saari, 1999, Saari, 2000, Saari, 2001), which would enhance in-depth learning, or Emotion Media (Saari, 2001), which would produce certain types of emotions. One may also imagine "Presence Media" which would semi-systematically produce different qualities of presence, such as depth, length, scope or other dimensions in different perceivers.

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