Tacit Design Issues Regarding the Use of Visual Aesthetics for Web Page Design

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Abstract

The development of broadband Internet and emerging and converging technologies are enabling designers to incorporate more high quality video and visual sensations as part of the persuasive appeal on their websites. This paper investigates the use of visual aesthetics as communication medium on web pages and specifically subconscious tacit principles designers apply when designing for these online visual interfaces. Issues addressed in this study include principles of conceptual blending, introspection, existing literature on visual aesthetics, the relevance of visual aesthetics and possibilities of applying it in web design. Some multivariate correlations between themes and topics arising from the data collection are highlighted and discussed. Lessons for academia and management are highlighted as conceptual blending is applied to assist in interpreting results.

Introduction

The research presented in this paper constitutes part of a greater study on the topic of visual aesthetics and its impact on online communication. It is also a follow-up paper on a further facet of visual aesthetics for web pages published in this journal in 2005 (see Krauss, 2005). Aspects related to subconscious tacit strategies that web designers use when applying visual aesthetics and other elements where visual communication is of importance, are highlighted in this paper.

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This research supports the relevance of visual aesthetics for web interfaces. It also highlights the need for designers to understand the subconscious nature of the process of visual aesthetics and subconscious tacit strategies designers use when they develop online visual interfaces. Designers from three different web design companies were interviewed during data collection regarding the issues mentioned above. Interviews were analysed using content analysis and the results are presented and interpreted. In addition, correspondence analysis is applied in order to understand possible multivariate correlations between themes identified in the content analysis.

Problem Statement and Rationale

Central to the problem that this study pursues is that until recently web design literature mostly focused on efficiency considerations, neglecting dimensions like aesthetic quality (Preece *et al.*, 2002: 143) and alternate ways in which people engage in online activities (Lavie & Tractinsky, 2003: 3,11; Park *et al.*, 2004: 352). Human Computer Interaction (HCI) literature expresses "only passing interest in the aesthetic dimension of interaction" (Lavie & Tractinsky, 2003: 11). In terms of heuristic evaluation, Preece *et al.* (2002: 412) highlight various heuristics for websites of which many resemble Nielsen's heuristics (Nielsen, 1994). None of them, however, adequately incorporate aesthetics as an integral element of the visual interface. There is therefore a lack of knowledge and guidance on the topic of visual aesthetics for websites. Although authors such as Preece *et al.* (2002) and Lavie and Tractinsky (2003) identify aesthetics as a contributor to HCI success, they still fail to relate aesthetics to successful communication. Literature generally disregards visual aesthetics which is about improving the communication situation (Zettl, 1999: 4) and impacting user perceptions (Lavie & Tractinsky, 2003: 29).

Krauss (2005: 308) explains visual aesthetics as a process by which people examine various media elements and their perceptual reactions to them. Zettl (1999: 123) states that applied visual aesthetics can improve the communication situation through clarifying, intensifying and interpreting a message. Addressing these objectives becomes especially important in the context of recent developments in broadband Internet (Park *et al.*, 2004: 351), emerging possibilities to use the Internet in different ways and the increasing importance of stimulating appropriate aesthetics responses in website users (Park *et al.*, 2004: 351; Lavie & Tractinsky, 2003: 3).

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A problem associated with the general disregard of visual aesthetics in web design is the difficulty to measure the impact of aesthetics on perception (Lavie & Tractinsky, 2003: 29), attitudes and behaviour (Fishbein & Ajzen, 1975, cited by Van Der Heijden, 2003: 542) and users' subconscious understanding of visual messages (Fauconnier & Turner, 2002: 5,6). Visual aesthetics mostly operates subconsciously and unknowingly (Zettl, 1999: 13; Sternberg, 1998: 167) while persuasion (which may be a product of visual aesthetics) is more successful when it affects subtle and subconscious understanding (Baron & Byrne, 1991:151). Relating to design, Crilly *et al.* (2004: 574) note that designers and experts often apply introspective and persuasive abilities subconsciously during the design process and "are not able to formulate what they know", hence this enquiry into tacit design strategies. Crilly *et al.* (2004: 550) note that designers communicate through their designs using their "skills, training and experience to produce products that induce a positive aesthetic impression". "Designers' tacit understanding of perception and visual composition often guide their intuitive judgments" (Crilly *et al.*, 2004: 558). The "visual form of products is often determined by designers' intuitive judgments and educated guesses" (Crilly *et al.*, 2004: 574). In addition, Krauss (2005: 312) portrays the subconscious cognitive process of conceptual blending as a plausible explanation of the process of visual aesthetics. In this follow-up study the author attempts to support Krauss' (2005: 312) reasoning by determining whether conceptual blending is also a subconscious element of the design process.

This study will, therefore, aim to identify and study tacit and subconscious design strategies for developing visual communication for websites. The study will also aim to establish whether principles of conceptual blending (Fauconnier & Turner, 2002) and introspection can explain these hidden processes. Parallel to that the study will confirm whether principles of visual aesthetics are relevant to web design (according to Krauss, 2005), whether designers apply and see the need for applying these principles and whether there is a need for a better understanding of visual aesthetics for web pages in general. Although understanding the impact of visual aesthetics on actual users will provide an important perspective in the study of visual aesthetics for web pages, it falls outside the scope of this investigation. Authors such as Krauss (2005) and Zettl (2005) shed more light on this aspect of visual aesthetics.

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Literature Review

According to Alben, 1996 (cited by Lavie & Tractinsky, 2003: 11), in general aesthetic criterion is an integral part of effective interaction design, especially when it is about effective communication. In the area of film and video, much has been done on visual aesthetics and how to get people involved in the message (e.g. Zettl, 2005 & Zettl, 1999). Relating these principles to web pages, Krauss (2005: 320) shows that principles of visual aesthetics used in video and film editing (e.g. Zettl, 2005) have much relevance in certain online visual contexts. Krauss (2005) highlights various principles of visual aesthetics for the web interface. These include colour temperature (Krauss, 2005: 322), psychological closure (Krauss, 2005: 327), the use of vectors (Krauss, 2005: 325), the predictive effect of visual aesthetics (Krauss, 2005: 323), the use of lighting (Krauss, 2005: 325), horizontal arrangement (Krauss, 2005: 325) and so forth. The detail regarding these principles of visual aesthetics is a separate study area and discipline and consequently falls outside the scope of this paper. For the reader it is necessary, however, to understand that the major function of visual aesthetics is based on the original meaning in Greek[1] which has the same root as that of perception (Zettl, 1999: 4; Lavie & Tractinsky, 2003: 5). Principles of visual aesthetics collectively aim to affect human perception and support communication intent. According to Zettl (1999: 7,8) the purpose of visual aesthetics is to build an event that will influence and guide the human mind to construct meaning. Sufficient consistency exists in human perceptual processes so that one can predict with reasonable accuracy how people will respond to specific aesthetic stimuli and contextual patterns (Zettl, 1999: 8). It is therefore expected that understanding human perceptual processes, the role of experience and the impact of these variables on attitudes and behaviour, will aid designers to develop successful websites. Knowledge on how to apply visual aesthetics correctly will assist designers in making visual prompts to support the intended message and ultimately communicate better.

An aspect of visual aesthetics that is an important consideration in the process of manipulating and impacting people's perceptions is the fact that it often occurs subconsciously and unknowingly (Zettl, 1999: 13; Sternberg,

[1] *Aisthanomai* = "I perceive"; *aisthetike* = "sense perception" (Zettl 1999: 4).

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1998: 167). A description of the subconscious impact of visual aesthetics therefore requires an investigation beyond explicit design principles and user experiences. This study therefore, focuses on tacit and subconscious issues regarding the use of visual aesthetics as visual communication medium.

The process of conceptual blending can be applied to many areas (Fauconnier & Turner, 2002: vii). Krauss (2005: 315) describes how the theory of conceptual blending relates to the process of visual aesthetics and website design. Fauconnier and Turner (2002) cited by Krauss (2005: 312), argue that a person builds a scenario of understanding or perception by blending or integrating different events (which may include existing experience or known events) and supplied inputs (e.g. a picture on a computer screen) through the abilities of *identification*, *integration* and *imagination*. A blend forms the creation of a new event in the viewer's mind that communicates meaning. Citing Fauconnier and Turner (2002), Krauss (2005: 312) relates conceptual blending to visual aesthetics as follows:

> How humans see one thing as one thing is regarded as a central problem of cognitive neuroscience, called the binding problem (Fauconnier & Turner, 2002: 6). One thing is constructed from various inputs, e.g. what we see, (colour, shape, position), what we smell, hear, etc. Binding these various inputs to one thing is the work of conceptual blending and we are not aware of its workings. We do not ask ourselves how we can see one thing as one thing and assume that the unity comes from the thing itself and not from our mental work, just as we assume that the meaning of a picture is in the picture rather than in our interpretation of its form. This shows that building a screen event is not that simple process as originally supposed. It is rather a complex process by which a number of visual elements are selected to act as visual inputs to the user with the same goal which is to work together to construct meaning in the mind of the user and facilitate the cognitive process of building an event.

Krauss (2005: 313,328) concludes that conceptual blending does occur in the minds of people who experience things, and that through the effective use of visual aesthetics one can take advantage of this human ability to create meaning or intensify a visual message. A website should be designed in such a

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way that elements of visual aesthetics create input spaces in the minds of users and that it collectively intensifies the message and creates the blends of new understanding of what the site wants to communicate. In this study conceptual blending assists in explaining the workings of visual aesthetics and the subconscious design processes designers use to develop visual communication for websites. The theory of conceptual blending, furthermore, supports the validity of using various introspective abilities such as analogy, identification, integration and metaphor to study and use visual aesthetics.

An issue that interrelates with conceptual blending is introspection[2] or introspective abilities. Messaris (1997: xiv), Large (2001: 81) and Engholm (2002: 196) acknowledge that drawing from their intuitive understanding and a growing body of research on the relationship of emotion and vision, visual communicators are able to elicit strong and primal reactions in users. The subconscious nature of these abilities is acknowledged (Crilly *et al.*, 2004: 574) in that design is a creative activity that seems not to be understood except by designers, and "they have not formulated what they know". Klopper (2003: 292) shows that viewers use introspection in order to make sense of what they perceive. Klopper furthermore explains that experts in different fields use introspective abilities to gain access (mostly subconsciously) to their own expertise, trained skills and knowledge in order to apply it in their respective areas, confirming the role of experience.

Research Design and Methodology

As shown in the previous section a study of visual aesthetics implies that the combined impact of elements of visual aesthetics should be investigated since they operate in concert with each other and various other website elements. Furthermore, many of the design strategies under investigation are tacit and subconscious issues and in-depth discussions and interviews are necessary to

[2] According to Encarta (1999) **introspection** is the detailed mental self-examination of feelings, thoughts, and motives. **Intuition** (Encarta, 1999) on the other hand is the state of being aware of or knowing something without having to discover or perceive it, or the ability to do this. It is something known or believed instinctively, without actual evidence for it. Although many authors and interviewees use these constructs interchangeably, the correct interpretation is in fact **introspection**.

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excavate these forms of knowledge from designers' conceptualisation and thinking[3]. Case study research appears to be most appropriate to investigate these issues since it is suitable for learning more about little known or poorly understood situations (Leedy & Ormrod, 2005: 135). During interviews elements of subconscious and tacit design issues were not explicitly mentioned by interviewees obviously due to the nature of these issues. The investigator therefore had to make inferences from interviewees' responses to case study questions. This could be seen as a subjective process and is indeed so. However, in qualitative research inferences are a natural part of discovery (Krippendorff, 1980: 26,33; Leedy & Ormrod, 2005: 133) and should be treated as such. Furthermore, according to Leedy and Ormrod (2005: 147) the researcher can be considered part of the data collection instrument. The investigator, using the literature as orientation, looked at the evidence in as many ways as possible and thus attempted to reduce bias.

	Interview Question	**Purpose of the Question**
i	What is your training and experience in the field of web and graphic design and how long have you been working in this field?	This question involves an enquiry to prior training and experience in web and graphic design. Where required interviewees will be presented with more specific and prompting follow-up questions to ascertain their knowledge of specific disciplines associated with web design as indicated by literature. The reason for this is to determine whether interviewees' exposure to these disciplines might possibly influence their perceptions and web design strategies. Although not explicitly stated, these prompting questions will furthermore assist in reminding them about their

[3] Many of the issues involve metacognition. **Metacognition** is knowledge about one's own thoughts and the factors that influence one's thinking (Encarta, 1999).

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		possible involvement in certain areas. It also aims to establish how knowledge of these areas was obtained, i.e. through formal training, experience or other means.

ii	Which design strategies do you apply to get your users involved in the websites that you design?	This question is to identify principles or guidelines that designers use intentionally (consciously) or unintentionally (subconsciously) to develop their websites. Where required more specific questions will be asked to prompt interviewees for further and more specific information. This can be seen as a strategy to assess to what extent they use tacit knowledge in web design activities and to identify the types of subconscious/unintentional design strategies interviewees use, such as principles of conceptual blending. It is also a strategy to determine if they apply visual design principles such as visual aesthetics to involve their users in their designs and communicate an online message. Although not explicitly stated, these prompting questions are posed to access interviewees' metacognitive knowledge and assist them to think deeper than the explicit or obvious.

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iii	The development of broadband Internet will encourage people to use the Internet in new and alternate ways and also affect the way in which you design web pages. What is you opinion on this?	This question aims to gain understanding on how broadband Internet and emerging and converging technologies might impact web design strategies and the way people use the Internet. It aims to obtain a view on the perspective of web designers on the impact of broadband Internet on web design and online activities and whether they see an opportunity to apply principles of visual aesthetics more extensively.

Figure 1: Interview questions

For this study, three small web design companies were approached as sources of data. These companies are not necessarily representative of the total population and were selected based on convenience and access. The data collection instrument is unstructured interviews with open-ended non-leading questions regarding the concepts uncovered in the literature. Interviews were held with all available web designers working in each company's environment. Designers from these companies were interviewed as three different cases in order to compare the results in the correspondence analysis and possibly generalise some of the findings to other situations (Leedy & Ormrod, 2005: 136). Uniformity of recording is sought for facilitating comparative analysis (Lubbe, 1998: 62). The interview questions are shown in Figure 1 together with the purpose of each question. The questions are reminders or prompts to the investigator regarding the information that should be collected. During interviews and where necessary follow-up questions and discussions occurred to gain better understanding of interviewees' metacognition. Although only three questions are shown here, the reader must be cognisant that this paper presents part of the results of a greater study on visual aesthetics and only the relevant parts of the data collection instrument is included here.

Content analysis is used to identify frequencies and intensities with which themes and concepts appear in interviewee responses. Themes and concepts are identified in the literature and refined during data analysis. A content analysis matrix is used to summarise the concepts that arise from the case study data (see Figure 2). Content analysis is by nature a subjective process

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that relies on content categories (referred to as Themes in this paper and numbered A1 to A8) being set up and the researcher then counting the number of occurrences of these categories (Lubbe, 1998: 95). The establishment of the manifest themes is one of the main areas of possible subjective bias. Further areas where bias may occur in this research are the process of counting the occurrences of concepts and relating these concepts to the respective themes. Individual concepts are listed in Appendix B to give the reader an idea of what emanated from case study interviews. However, the themes and concepts in Figure 2 and Appendix B may be meaningless to the reader without the interpretations and context provided in the discussions thereof.

Correspondence analysis was used to help corroborate the findings of the content analysis and interpret the data. Since correspondence analysis provides a perceptual map of the data, it can provide a deeper insight into the multivariate nature of the data. Associations between variables can be seen and therefore be more easily interpreted (Greenacre, 1984 cited by Lubbe, 1998: 112; Bendixen, 1996: 22). Content analysis revealed that the case study participants are concerned about eight major themes. The next step in the data analysis was to establish how these themes related to each other and to the different participating companies or cases. Correspondence analysis was used for doing so.

Interpretation of Content Analysis Results

Although Figure 2 displays related themes in order of frequency it should be viewed in conjunction with the discussions of the various themes in order to gain the correct perspective and understanding. The frequencies should therefore not be seen as some order of importance but rather as a point of departure for discussion. In the following sections the author explains themes as well as the context in which they appeared in interviewee responses. The detailed distribution of frequencies per company and individual are shown in Appendix A. Concepts furthermore could relate to more than one theme and therefore may appear more than once under the themes in Appendix B.

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	Themes	Theme Code	Total	%	Accum %
1.	Using intuition / introspection / experience (of self & others) / understand own thinking	**A3**	57	23	23
2.	Reference to principles of conceptual blending used during design	**A2**	48	20	43
3.	Using principles of visual aesthetics (using specific elements of visual aesthetics)	**A4**	36	15	58
4.	Conscious awareness of principles of visual aesthetics and its effect on users	**A5**	33	13	71
5.	Design is multi-modal / multi-functional / multi-disciplinary	**A8**	25	10	81
6.	Alternate uses of the Internet / different surfing objectives for users / the possible impact of broadband on Internet usage	**A1**	20	8	89
7.	Design interactive sites / design to get the user involved in the process in general	**A7**	15	6	96
8.	Limitations of current design courses / literature	**A6**	11	4	100
	Total scores		**245**		

Figure 2: Content analysis showing relative frequencies and percentages for design approaches used by designers

Figure 2 shows that in the transcript of the case study interviews, there are 57 major references to *using intuition, introspection or experience (of self and others) during the design process or the need and ability to understand one's own thinking* (Theme A3), there are 48 references *to the use of principles of conceptual blending as part of the design process* (Theme A2), and so forth.

Using Intuition / Introspection / Experience (of self & others) / Understand Own Thinking (Theme A3)

Theme A3 groups concepts that relate to the use of intuition, introspection and experience. As indicated in the literature introspective abilities are an intricate part of the design process. This is confirmed by the theme. Concepts relating to the use of introspection in web design, i.e. understanding one's own thinking

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and relying on the introspective abilities of one-self and others are all grouped under this theme. Results of this grouping confirm that designers rely on introspective abilities during the design process. It shows that these introspective processes often operate subconsciously or tacitly and that one should be aware of these introspective abilities that operate during thinking and design. The theme also shows that designers tap into the introspective abilities (or experience) of colleagues by asking their feedback and by looking at examples and work of each other. This theme, furthermore, confirms that introspective abilities are based on experience and may develop through experience. It confirms that by knowing about and developing introspective abilities, designers are able to elicit strong and primal reactions in their users i.e. if designers understand their own thinking they will be able to persuade and communicate better.

Learning and experience are important facets of Theme A3. Designers learn from each other, they learn from examples and they learn from understanding their clients. This theme therefore closely relates to the next theme (Theme A2), because designers need to identify design elements that are useful and integrate it in their own environments using their imagination and creative ability, confirming the process of conceptual blending (see Section 3, Literature review).

Reference to Principles of Conceptual Blending Used During Design (Theme A2)

Concepts grouped under this theme relate to principles of conceptual blending that designers use (consciously or subconsciously) during the design process. Theme A2 shows that designers use metaphor and analogy to describe their design approaches. They also use analogy and metaphor in their designs for their users to associate and relate to. The theme confirms that imagination plays a pertinent role during design and that designers rely on both their own and their users' abilities to identify and integrate concepts. It shows that although designers are not aware of conceptual blending, they subconsciously apply it by using visual and other elements on their website to create input spaces that function together to create units or blends, sometimes using various sensory inputs. Concepts also show that conceptual blending operates subconsciously as expected from the theory. Although many researchers may

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argue that design principles are explicit and formalised, this theme shows that tacit and subconscious strategies do exist in the process of design and that the theory of conceptual blending may assist in explaining some of these strategies.

Using Principles of Visual Aesthetics (Using Specific Elements of VA) (Theme A4)

Concepts grouped under this theme show that designers apply various principles of visual aesthetics in their design activities. These are, for example, the use of graphics or visual aesthetics to attract attention, lead the eye and entice the user to get involved. It also shows that graphic design (which implies the use of visual aesthetics) is a concept or an argument rather than just for the purpose of making beautiful. Principles of psychological closure and colour desaturation (Krauss, 2005: 321, 327) have been implied and some functions of lighting, colour and motion (Zettl, 2005) have been mentioned. The specific use of elements of visual aesthetics, however, is much less compared to its use in film and video. The notion that the principles applied in film and video production will be used more and more in the future has been expressed a number of times, for example in the comment that "the lines between TV and the Internet is blurring". Many of these comments are made in context of the impact of broadband Internet and emerging and converging ways in which people use the Internet (see interview question iii, Figure 1).

Conscious Awareness of Principles of Visual Aesthetics and its Effect on Users (Theme A5)

Although Theme A5 overlaps to a large degree with the previous theme, the investigator sought out concepts that show that designers are consciously aware of principles of visual aesthetics. This theme shows that to a certain degree, designers are aware of elements of visual aesthetics. Their knowledge, however, is fairly limited compared to that portrayed in Zettl (2005) and Krauss (2005). It shows that there is a need to address visual aesthetics as part of web design training and to treat video editing knowledge as a necessity for the current web design milieu. In fact, in Appendix A (Theme A5), the reader will observe that in general company 2 has shown considerably more conscious knowledge of elements of visual aesthetics. When posed with the question of how the company acquired this knowledge, participant 2.2

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remarked that it was through the video editing course that he had done. Being the director as well, this participant consequently influenced his employees in this area. Formal training in video editing and visual aesthetics could therefore be a valuable asset for web designers.

Design is Multi-modal / Multi-functional / Multi-disciplinary (Theme A8)

Under Theme A8 the author sought out concepts regarding the multi-disciplinary nature of the Internet with specific reference to current and future developments. This theme confirms that established web design guidelines (e.g. Nielsen, 2000; Nielsen, 1994; Preece *et al.*, 2002: 412) are inadequate for the evolving and versatile nature of the Internet, especially where it concerns graphic and communications design. Knowledge of human factors in HCI will become increasingly important for web design as well. It shows that web design is gradually becoming a multi-disciplinary and multi-functional process in which designers need knowledge of various areas. According to participants these include graphic design, knowledge of video editing, advertising, latest technological developments and marketing. Knowledge of Flash™ as a graphic design tool was mentioned several times. Some participants hinted towards knowledge of psychology, noting that it would be useful to have some background in that in order to know their users better. It seems that ultimately design teams need to consist of experts in a number of areas in order to appropriately address these multi-disciplinary issues.

Designers interviewed stated that in general they seldom design only a website for their clients. Normally they have to address their clients total design portfolio, which may include for example printed media and a marketing concept. A website is therefore seldom considered in isolation and forms part of a client's total marketing strategy, hence the need for knowledge on marketing. The investigator noted that the type of website or design determines the skills needed. A database driven website, for example, requires more programming and technical knowledge. Here usability and functionality plays an important role. In general the first company interviewed is more involved in these types of websites and some of their perspectives on graphic design and visual communication reflect this (see Appendix A). The second company, on the other hand, has stronger opinions on visual communication

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and generally stated that web design is normally a small percentage of their client's total design portfolio.

Alternate Uses of the Internet / Different Surfing Objectives for Users / The Possible Impact of Broadband on Internet Usage (Theme A1)

Against the background of current technology developments and broadband Internet, Theme A1 aimed to identify whether there are emerging and alternate uses for the Internet. This theme also aimed to identify alternate reasons why people use the Internet. The notion was expressed that broadband Internet and new developments may render current design principles limited. Based on their experience designers made some predictions regarding alternate uses for the Internet and how it will impact the way people interact online. These include new design methods and trends, more interactive sites, more businesses and people using the Internet, more video based web pages, more entertainment, more graphics and Flash, and so forth (see Appendix B). These concepts imply extensive use of visual aesthetics in web pages.

Design Interactive Sites / Design to Get the User Involved in the Process in General (Theme A7)

Concepts under Theme A7 relate to the fact that an important aim of most sites according to participants is to get the user involved and the role that graphics plays in this process. Concepts that describe this include that a site must entice a person to explore further and that one needs to design interactive sites so that people want to be there. Concepts that specifically point to the use of graphics or visual elements are that the purpose of graphics is to entice and that interaction is more important (against the background of emerging and converging technologies and broadband Internet) in a playful sense, like gaming even on corporate sites. Interviewees noted that broadband will enable more interactive sites, new possibilities and sites that "talk back". According to one participant the purpose of graphics is to entice.

Although designers do not explicit refer to visual aesthetics as such but rather use the general term "graphics", this theme confirms the literature that increasingly there is a need for designers to advance their users from being passive communicators into active communicators. It confirms that visual

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aesthetics seems to be a vehicle to achieve this and that knowledge of visual aesthetics will assist designers to be more successful in their communication objectives.

Limitations of Current Design Courses / Literature (Theme A6)

Theme A6 groups concepts related to the value of literature and design courses for current and expected future uses of the Internet. Although it was not a major topic of discussion during the case study interviews, interviewees generally noted that although design courses provide a valuable point of departure they are generally limited and teaches only the basics, and that it will probably be inadequate for designing for many broadband based websites. Some participants argued that according to their experience, books on web design are not useful and are outdated quickly, and that they do not really use books in their day to day design activities. One could deduct from this that there are considerable limitations to available literature and established guidelines for web page design. This could confirm that websites increasingly contain multiple elements due to new developments (see the discussions on themes Theme A7 and Theme A1 in the previous sections) and that web developers find it difficult to properly interpret web design heuristics (e.g. Nielsen, 1994; Preece *et al.*, 2002: 412) in specific online contexts. Most interviewees stated that they would rather gather examples from which they can collect ideas while learning from co-designers and colleagues. This confirms that to a large extent designers rely on their own introspection and experience as well as that of their colleagues. Responses from participants indicate that there seems to be a need to understand which specific visual principles have what effect on its viewers highlighting the need for knowledge on visual aesthetics. Some participants investigated aspects such as the psychology of colour in order to design better. None of them investigated visual aesthetics per se.

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The Use of Correspondence Analysis

THEMES	Theme Code	Company 1	Company 2	Company 3	TOTALS
Alternate uses of the Internet / different surfing objectives for users / the possible impact of broadband on Internet usage	A1	1	16	3	20
Reference to principles of conceptual blending used during design	A2	13	23	12	48
Using intuition / introspection / experience (of self and others) / understand own thinking	A3	22	23	12	57
Using principles of visual aesthetics (specific use of elements of VA)	A4	10	22	4	36
Conscious awareness of principles of visual aesthetics and its effect on users	A5	7	18	8	33
Limitations of current design courses / literature	A6	1	6	4	11
Design interactive sites / design to get the user involved in the process in general	A7	0	9	6	15
Design is multi-modal / multi-functional / multi-disciplinary	A8	1	22	2	25
Total		**55**	**139**	**52**	**245**

Figure 3: Summary results for design approaches used by designers

Total Inertia=.15465 Chi^2=38.044
Degrees of freedom=14

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No of dimensions	Singular Values	Eigen-Values	Perc. of Inertia	Cumulatv Percent	Chi squares
1	0.324657	0.105402	68.15461	68.1546	25.92898
2	0.221922	0.049249	31.84539	100.0000	12.11537

Figure 4: Eigenvalues and Inertia for all dimensions

Figure 3 shows the result of the content analysis detailed by participating company. All sections of Figure 3, i.e. rows 1 to 7 for all columns, were extracted for processing using the correspondence program STATISTICA version 7.1 by StatSoft, Inc. STATISTICA produces a number of tabular reports and one graph. For the purpose of this research the tables presenting the row and column coordinates and contributions to inertia as well as the eigenvalues and inertia for all dimensions were used to assist in the interpretation of the graph (see Figure 4 and Tables 1 and 2 in Appendix C).

Inertia may be explained as a measure of the total variability in the original data set (Lubbe, 1998: 114; Garson, no date: 4). There is one eigenvalue for each dimension, sometimes labelled inertia for that dimension. Each eigenvalue is the amount of inertia (variance) a given factor explains in the correspondence table. Eigenvalues reflect the importance of the dimensions (Garson, no date: 4). The first dimension always explains the most inertia (variance) and has the largest eigenvalue, the next the second-most, and so on. The sum of eigenvalues is the total inertia (Garson, no date: 4). The maximum number of eigenvalues that can be extracted from a two-way table is equal to the minimum of the number of columns minus 1 and the number of rows minus 1 (StatSoft, 2003: 3). Therefore, since three cases are presented in Figure 3, only two dimensions are reflected in Figure 4 as produced by STATISTICA.

Figure 4 shows that one dimension explains 68.15% of the total data variability and two dimensions explain 100% of the total variability. Figure 5 is a perceptual map with the axes defined and perceived groupings of points. It shows the relative positions of the different themes and the different participating design companies. As mentioned before A1, A2, A3, etc. represent the various themes that emanated from the case study data. The participating companies are indicated by the word "Company" and numbers 1,

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2 or 3. The coordinates for the column and row variables are presented in Tables 1 and 2 in Appendix C.

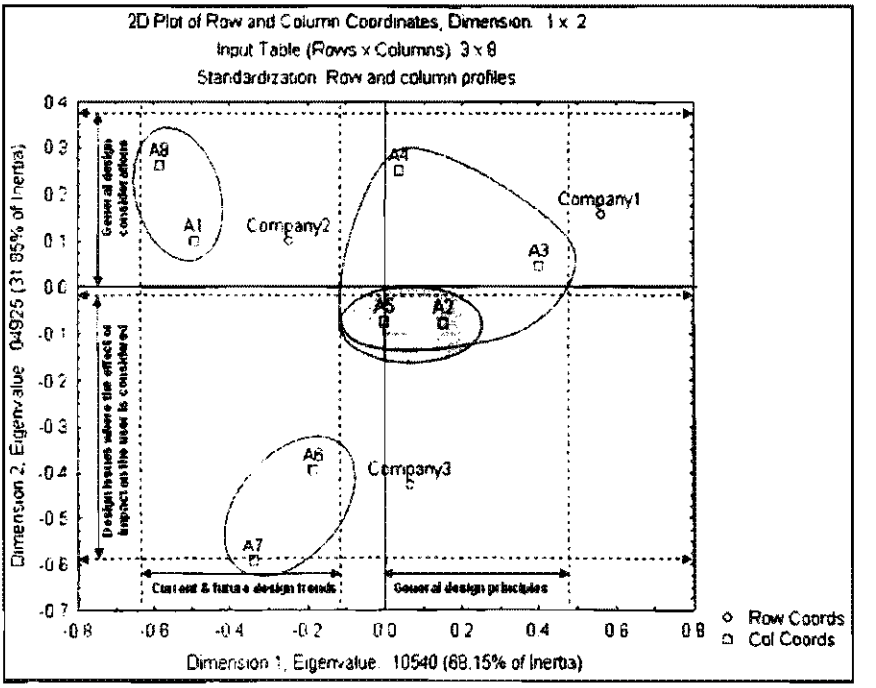

Figure 5: The perceptual map showing relative distances.

The axes in Figure 5 represent the relative chi-squared distances of the data points in the frequency matrix from the centre of gravity of the original data set or matrix. The centre of gravity is the arithmetic mean profile of both the rows and the columns of the original data set. The chi-squared distance is a measure of the deviation of the observed distances from the expected distances (Lubbe, 1998: 116). The axes are numerical scales that are produced to show relative distance from the centre of gravity in a graphical way (Lubbe, 1998: 116). Both row data values and the influence of the column values associated with the row variable determine the position of the data points.

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According to StatSoft (2003: 4) and Bendixen (1996: 26) the distances between row variables and the distance between column variables is meaningful and may be interpreted, but the distance between row and column variables can not be interpreted. However, it is appropriate to make general inferences about the nature of dimensions based on which side of the origin particular points fall (StatSoft, 2003: 4). A row point or grouping of row points may point out a tendency of a column point that finds itself within the same area on the perceptual map. The perceptual map is the primary product of correspondence analysis and it shows how row and column variables may be grouped. It is, however, up to the analyst to attribute meaning to the axes.

The first step in this process is to decide, based on the research context, whether to interpret the axes in terms of rows or columns. Against the background of this study it seems more appropriate to interpret themes in company context. Secondly, axes are interpreted by way of the contribution that each element (in this case themes) makes towards the total inertia accounted for by the axis. There are eight themes, thus in general, any contributions greater than 12.5% (100/8 = 12.5%) would represent a significant association which is greater than the expected and would consequently determine the various axes (Bendixen, 1996: 28). The squared correlation presented for any variable or theme measures the degree of association between that variable and a particular axis (Bendixen, 1996: 30). Examining the detailed report in Table 1 in Appendix C and specifically the Cosine^2 columns (also labelled squared correlations) for dimensions one and two (StatSoft, 2003: 7 & Bendixen, 1996: 28), one can see that Themes A1, A2, A3 and A8 "determine" or are more closely associated with the first axis. Themes A4, A5, A6 and A7 on the other hand are more closely associated with the second axis. In the first dimension, Theme A1 and A8 have negative coordinates, while Themes A2 and A3 have positive coordinates. Themes A1 and A8 therefore are related, while A2 and A3 are related. In the second dimension Theme A4 has a positive coordinate while Themes A5, A6 and A7 have negative coordinates.

The reader should keep in mind that this is qualitative research and that the process of understanding the meaning of axes explained above and the grouping of themes should be thought of as a general guideline for interpretation and explanation rather than a strict mathematical rule. The

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degree of the association (Cosine^2) between themes and axes should be treated as a guide to understand the grouping of themes rather than the other way round (Bendixen, 1996: 30). A relatively weak association (Cosine^2) between point and axis should therefore be treated with caution during interpretation. Furthermore, the quality of representation of row and column in the number of dimensions presented in this study will be 100% for all points since there are only two dimensions explained in the correspondence analysis. Therefore, the sum of row and columns Cosine^2 and quality of representation present the same values in this study (see Appendix C Table 1).

Interpretation of Correspondence Analysis Results

The variables to the left of the vertical axis (Figure 5) have the common theme of current and future design trends. Themes with positive coordinates on the horizontal axis generally address design principles used by designers during the design process where the focus is on how to communicate successfully using graphics and other elements. On the vertical axis, points with negative coordinates group design issues where the effect or impact on the user is considered. Variables with positive coordinates on the vertical axis seem to be the opposite in that it groups general design considerations other than those where the impact on the user is considered. As mentioned earlier many of the concepts mentioned by participants relate to more than one theme and therefore the logical distinction between variables and axis could be vague in some cases. The proposed meaning of the various axes should be seen as a general guideline for discussion. Furthermore, variables grouped on opposite sides of an axis do not necessarily refer to logical opposite topics or themes (Bendixen, 1996: 29). The groupings of points in the various quadrants of the perceptual map are the main product of the correspondence analysis.

Considering the description of the themes in Section 5, it is evident that the grouping of Themes A1 and A8 address future and alternate uses of the Internet and how to design for this environment. A relatively strong association (see the Cosine^2 values in Table 1 Appendix C) between both Themes A1 and A8 and the first dimension shows that these two points present a prominent grouping. From this association one can infer that in order to design for the alternate ways in which people use the Internet, designers need to be multi-functional and multi-disciplinary, having knowledge of more that just usability and basic web technologies. One could infer that alternate ways in which

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people use the Internet are related to a multi-disciplinary multi-modal design approach. Against the background of the literature one may deduct that in order to take full advantage of the possibilities of emerging and converging technologies, designers need to have training and experience in various disciplines or areas. This confirms the interpretation of the content analysis (Section 5). Since Company 2 is in proximity of the grouping of A1 and A8 (especially A1 in terms of the vertical axis) it could be inferred that this company shows relatively strong awareness of alternate uses of the Internet and the impact of broadband. It also seems that Company 2 has a multi-disciplinary and multi-functional approach to web design while current and future trends tend to direct their design approaches.

Themes A6 and A7 are not closely associated to the horizontal axis but rather to the vertical axis according to the Cosine^2 columns in Table 1 Appendix C. They are, however, on the same side on the horizontal axis as Themes A1 and A8 and on the opposite side on the vertical axis (see Figure 5) in relation to Themes A1 and A8. They form part of the general theme of current and future design trends (i.e. they have negative coordinates in terms of the horizontal axis). The A6 and A7 grouping shows that participants consider Themes A6 and A7 related and one could conclude that design courses and literature are limited in that they do not address the need for designers to know how to get users involved in the websites that they design. One can also infer that according to participants, design courses and literature are inadequate to address design approaches for future and alternate ways in which people use the Internet. This association furthermore points out that design courses and literature do not address the multi-disciplinary nature of the actual web design process. It confirms the notion highlighted in the content analysis stating that existing design courses and literature provide a point of departure rather than a comprehensive design approach (see Section 5.8). Theme A7 in the grouping on the horizontal axis seems to point out that alternate, future and multi-modal web design approaches entail the design of interactive websites or sites that aim to get the user involved in the communication process; it shows that broadband will enable more interactive websites and that design courses and literature in general are limited in showing designers how to achieve this. The A6 and A7 grouping seems to explain the general design point of view of Company 3 which is in proximity of the grouping.

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The mention of graphics in Themes A1, A8, A6 and A7 seems to show that the use of visual aesthetics may be a vehicle to address the needs and limitations that emanated from these themes. One may deduct from this that visual aesthetics, or graphics, as participants loosely referred to it, is a way to get people involved in the communication process and that it will become more prominent in future through broadband developments. Design courses and web design literature should incorporate knowledge of visual aesthetics and topics such as video editing, marketing, photography and social psychology supporting multi-disciplinary design.

Based on the perceptual map (see Figure 5), Themes A2, A3, A4 and A5 are associated with each other. Themes A2 and A5 are related more closely while A3 and A4 are somewhat detached. As mentioned earlier these themes generally address principles that designers use (knowingly or unknowingly) to design their websites. The grouping of A5 and A2 shows that when designers are consciously aware of principles of visual aesthetics, they seem to simultaneously refer to principles of conceptual blending to describe their use of visual aesthetics. In context of the discussions of Themes A2 and A5 in Section 5, it could support that to a certain degree principles of visual aesthetics are in fact also principles of conceptual blending. It seems to support the reasoning in the theory that conceptual blending can be used to explain the workings of visual aesthetics (Krauss, 2005: 315), that elements of visual aesthetics create blends in the minds of its viewers and that knowledge of conceptual blending will assist designers in applying various visual and other elements more successfully in their web design environments. The proximity of Theme A3 to the grouping of A2 and A5 could reveal that the use of introspective abilities and experience plays a role in the application of visual aesthetics especially where the impact on the user is considered. It also shows that conceptual blending and visual aesthetics are applied introspectively and subconsciously by designers and the ability to use it improves through experience.

Although Theme A4 could be seen as being in relative proximity of the grouping of A2 and A5 it is also somewhat detached. This association could imply that when designers use specific elements of visual aesthetics, they tend to do it intuitively (or introspectively), using conceptual blending while considering the impact it has on the users. They do not consciously follow

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specific guidelines when designing. This could emphasise the need for knowledge on principles of visual aesthetics in order to apply it more constructively and consciously. In context of the explanation of the themes in Section 5 designers determine the possible impact that elements of visual aesthetics will have on their viewers by considering the impact it has on their own perceptions. They will also rely on their own experience (e.g. what did this visual association mean in other contexts) and on the experience and perceptions of colleagues. During interviews, many designers mentioned that they would ask a colleague if they understand their designs. However, on the perceptual map the association between Theme A4 and the A2, A3 and A5 grouping is not prominent and further research might be needed to confirm this. Company 1 finds itself in proximity of A3 and therefore seems to have these tendencies in their design approaches.

In general the results of the correspondence analysis should not be considered in isolation but in context of the content analysis and the literature review. Additional research will shed more light on the associations between variables. However, the analysis of literature, the content analysis and the correspondence analysis in general confirm one another and therefore the research results may be relevant to other contexts.

General Observations Regarding Designer Training

In general interviewees found it difficult to explain their own thinking, perceptions and metacognitive knowledge, for example explaining their perceptions of the impact of elements of visual aesthetics and explaining how they design to get their user involved in the communication process. It is as if designers either design intuitively or do not explicitly think about effective communication at all during design. This difficulty was anticipated before data collection and the investigator therefore asked follow-up and prompting questions where necessary. It was furthermore noted that individuals with training in visual communication such as graphic design and video editing are more able to explain their design strategies and thinking regarding the aspects mentioned above. Designers from a programming background or who were self-trained rely more on introspective abilities and "gut feel". Some designers from a programming background explicitly argued against the need for using visual aesthetics in websites. This tendency could be the result of their training (or lack of training in visual communication) and subsequent work experience.

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All designers interviewed apply principles of visual aesthetics to some degree in their designs. Those with training and a background in areas related to visual communication tend to do it more consciously and constructively. One can therefore conclude that training in visual aesthetics will assist designers in applying visual aesthetics more successfully to support communication objectives.

Summary of Conclusions

In general the discussions of the various themes show that designers learn from other media forms, that in terms of graphic design the borders between various media forms tend to merge, conceptual blending is subconsciously applied during design and various principles of visual aesthetics are used in the design process. These principles include the contextual nature of visual aesthetics, some functions of colour and the subconscious impact of visual aesthetics. Specific functions of colour, lighting, shape and on-screen arrangement (such as vectors, size and psychological closure) are not identified or consciously applied by designers. This is probably because the Internet does not lend itself to applying all principles of visual aesthetics yet as is the case in video editing. Visual aesthetics is not exploited to the same degree as in film and video production and therefore designers seem not aware of its potential and how to apply it. From the interviews it seems that visual aesthetics is not adequately addressed in web design training courses and literature and that these limitations are especially critical against the background of emerging and converging technologies. One interviewee noted that when trainers do address visual aesthetics they tend to use random examples mostly based on their experience. Confirming Fauconnier and Turner (2002: 14), trainers probably disregarded visual aesthetics in the past due its lack of form and difficulty to measure (Krauss, 2005: 318). This study concludes that introspection and experience as tacit abilities are applied in web design and that conceptual blending is a tacit process used by designers for the development of visual communication.

Limitations and Scope

This study is primarily a qualitative, interview-based investigation of the perspectives of website design practitioners. According to Leedy and Ormrod (2005: 133) qualitative research is not necessarily about the discovery of a

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single ultimate truth, but rather a study of the nature of multiple perspectives held by different individuals, with each of the perspectives having equal validity or truth. Representivity is therefore not an issue.

This study does not highlight all tacit design strategies for web page design. It highlights some limitations of web design literature such as that it does not consider tacit design strategies and visual aesthetics adequately.

This study furthermore focuses mainly on visual design principles and visual aesthetics and not for example on website usability or other sensory inputs. As mentioned in the statement of the problem, the intention of the study is to identify and highlight some subconscious tacit design strategies for visual communication for websites. It therefore lays the foundation for further studies in visual aesthetics for web pages by presenting the subjective perspectives of some web designers.

In Retrospect – Using Conceptual Blending to Interpret Findings

Results show that designers use metaphors to describe some of their designs and concepts. They learn from others by looking at their designs and by asking for their colleagues' feedback on their own designs. In context of converging and emerging technologies, according to designers, it becomes necessary to learn from other media forms such as video. Consequently it becomes necessary to apply principles of conceptual blending to identify and relate design ideas in these media forms to the changing web design milieu. Since designers are often involved in a client's total design portfolio (which includes marketing, printed media, radio, TV, etc.) it is necessary to consider the design of a website in context of other forms of communication. As stated by one interviewee, a website is often supported by printed and other media. Design teams have to decide on a theme or a brand image that can be carried through to other media forms. A website should, however, be able to communicate independently supporting a company's corporate image. It is here where the ability of conceptual blending assists in creating unity and context.

According to Morrison (2003) the process of conceptual blending assists in contextualising various related concepts in the visual communication environment. Designers therefore not only develop independent concepts or visual elements that communicate facts and content but apply conceptual

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blending to synthesise ideas and concepts and create meaning (Morrison, 2003). Learning is an integral part of interacting with a website. Integration of information, constructs and concepts enable users "to make sense of and create meaning from divergent streams of data and non-liner links to ideas" (Morrison, 2003). This confirms the role of conceptual blending.

Regarding multi-disciplinary teams such as design teams, conceptual blending enables users and also web project facilitators to understand and synthesise ideas drawn from various disciplines and dissimilar units of knowledge. Turner (2001: 151) cited by Morrison (2003) states that:

> The theory of conceptual integration [blending] is an attempt to provide substance to the intuition that meaning descends through elaborate, perpetual, and distributed processes of modification, inheritance, and selection, to develop richness, diversity, and nuance that characterize cognitively modern human beings and the complex societies they make.

From this one can infer that web development project managers, applying and exercising knowledge of conceptual blending, will be able to more constructively facilitate the various skills and personalities in their design teams so that a webpage integrates and blends previously divergent units of information. The ability to apply conceptual blending in this context develops mainly through experience while conceptual blending provides substance to or an explanation of these subconscious abilities.

Furthermore, converging and emerging technologies such as broadband and its consequences provide opportunities to enhance the richness of information and content. Visual, audio and haptic possibilities of multimedia will assist in providing context, trigger reflection (introspection or further blends[4]) and facilitate possibilities that produce association and the capacity to deal with issues from various disciplinary sources (Morrison, 2003).

Although it is not tested empirically in this study the author observed the role of the project manager or facilitator during the initial phases of

[4] Blending is recursive, in that products of prior blending can themselves become inputs to further blends (Sinding, 2001).

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brainstorming and design idea development to be the person that constantly focuses ideas and suggestions. It involves contextualising and interpreting isolated ideas to the general aim and focus of the business objectives. The facilitator often provides additional perspectives during design on issues such as budget, client personality and needs, website audience, marketing strategies and the role of other forms of communication. Morrison (2003) confirms this reasoning stating that the building of teams relies on the team having a "core story" that expresses shared values. Kenney and Leggiere (2003) state that "conceptual blending can help the team derive new, related sub-stories to tackle various business and technical questions"; furthermore, that "through trial and error teams then map elements from one input space to another", which provides the answer to the questions brainstormed. It shows therefore that conceptual blending explains how multi-disciplinary projects such as web page design take shape.

References

Baron, Robert A & Donn Byrne 1991. *Social Psychology: Understanding Human Interaction*. Boston, MA: Allyn and Bacon.

Bendixen, Mike 1996. A Practical Guide to the Use of Correspondence Analysis in Marketing Research. *Marketing Research On-Line* 1:16-38.

Crilly, N, J Moultrie & PJ Clarkson 2004. Seeing Things: Consumer Response to the Visual Domain in Product Design. *Design Studies* 25,6:547-577. Accessed 8 February 2005 at www.ScienceDirect.com.

Encarta 1999. *Encarta World English Dictionary*. Developed for Microsoft by Bloomsbury Publishing Plc. CD-ROM.

Engholm, Ida 2002. Digital Style History: The Development of Graphic Design on the Internet. *Digital Creativity* 13,4:193–211. Accessed 14 March 2005 at EBSCOhost online research database.

Fauconnier, G. & M Turner 2002. *The Way we Think: Conceptual Blending and the Mind's Hidden Complexities*. New York: Basic Books.

Garson, David. Undated. *Correspondence Analysis*. Accessed 26 October 2005 at http://www2.chass.ncsu.edu/garson/pa765/correspondence. htm.

Kenney, C. & P Leggiere 2003. *Across the Chasm*. Accessed 10 August 2006 at http://www.intelligententerprise.com/030320/605feat32.jhtml.

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Klopper, R 2003. Yesterday is Another Country ... Image Schemas in Conceptual Blending to Optimize Human Scale Thinking. *Alternation* 10,2: 292-320.

Krauss, Kirstin 2005. Visual Aesthetics and its Effect on Communication Intent: A Theoretical Study and Website Evaluation. *Alternation* 12,1a: 305-329.

Krippendorff, K 1980. *Content Analysis: An Introduction to its Methodology*. Beverly Hills, CA: Sage Publications.

Large, Michael 2001. Communication among all People, Everywhere: Paul Arthur and the Maturing of Design. *Design Issues* 17,2: 81-90. Accessed 16 August 2005 at EBSCOhost online research database.

Lavie, T & N Tractinsky 2003. *Assessing Dimensions of Perceived Visual Aesthetics of Web Sites*. Israel, Negev: Ben Gurion University. Accessed 26 May 2004 at http://burdacenter.bgu.ac.il/ publications/finalReports 1999-2000/TractinskyLavie.pdf.

Leedy, Paul D & Jeanne Ellis Ormrod 2005. *Practical Research: Planning and Design*. New Jersey: Pearson Education.

Lubbe, Sam 1998. *IT Investment in Developing Countries: An Assessment and Practical Guideline*. London: Idea Group Publishing.

Messaris, Paul 1997. *Visual Persuasion: The Role of Images in Advertising*. California: Sage Publications.

Morrison, JL 2003. Conceptual Integration in Online Interdisciplinary Study: Current Perspectives, Theories, and Implications for Future Research. *The International Review of Research in Open and Distance Learning* 4,2. Accessed 5 August 2006 at http://www.irrodl.org/ index.php/ irrodl/article/viewArticle/154/235.

Nielsen, Jakob 1994. *Nielsen's Heuristics*. Accessed 11 April 2005 at www.useit.com/papers/heuristic/heuristic_list.html.

Nielsen, J 2000. *Designing Web Usability: The Practice of Simplicity*. Indianapolis, IN: New Riders.

Park, S, D Choi & J Kim 2004. Critical Factors for the Aesthetics Fidelity of Web Pages: Empirical Studies with Professional Web Designers and Users. *Interacting with Computers* (pp. 351-376). Accessed 18 February 2005 at http://hci.yonsei.ac.kr/non/e01/04_aesthetic%20 fidelity.pdf.

Preece, J, Y Rogers & H Sharp 2002. *Interaction Design: Beyond Human-Computer Interaction*. New York: John Wiley & Sons, Inc.

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Sinding, M 2001. Assembling Spaces: The Conceptual Structure of Allegory. *Proceedings of the American Comparative Literature Association*, University of Colorado. Accessed 7 August 2006 at http://www3.sympatico.ca/knight.sinding/acla/sinding.htm.

StatSoft, 2003. *Correspondence Analysis.* Accessed 25 August 2005 at http://www.statsoft.com/textbook/stcoran.html.

Sternberg, Robert J 1998. *In Search of the Human Mind.* Orlando, FL: Harcourt Brace & Company.

Van der Heijden, Hans 2003. Factors Influencing the Usage of Websites: The Case of a Generic Portal in the Netherlands. *Information & Management* 40,6:541-549. Accessed 16 August 2005 at www.sciencedirect.com.

Zettl, H 1999. *Sight, Sound, Motion: Applied Media Aesthetics.* Belmont, CA: Wadsworth.

Zettl, H 2005. *Sight, Sound, Motion: Applied Media Aesthetics.* Belmont, CA: Wadsworth.

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Appendix A – Summary of themes including frequencies of individual participants

Theme code	THEMES	Participant 1.1	Participant 1.2	Participant 1.3	Participant 1.4	Company 1	Participant 2.1	Participant 2.2	Participant 2.3	Company 2	Participant 3.1	Participant 3.2	Company 3	TOTALS
A1	Alternate uses of the Internet / different surfing objectives for users / the possible impact of broadband on Internet usage	1	0	0	0	1	4	6	6	16	1	2	3	20
A2	Reference to principles of conceptual blending used during design	6	3	0	4	13	5	9	9	23	8	4	12	48
A3	Using intuition / introspection / experience (of self and others) / understand own thinking	5	4	4	9	22	7	9	7	23	7	5	12	57
A4	Using principles of visual aesthetics (specific use of elements of VA)	7	0	0	3	10	7	8	7	22	3	1	4	36
A5	Conscious awareness of principles of visual aesthetics and its effect on users	4	0	1	2	7	2	8	8	18	4	4	8	33
A6	Limitations of current design courses / literature	1	0	0	0	1	2	2	2	6	2	2	4	11
A7	Design interactive sites / design to get the user involved in the process in general	0	0	0	0	0	4	2	3	9	3	3	6	15
A8	Design is multi-modal / multi-functional / multi-disciplinary	0	0	0	1	1	8	11	3	22	2	0	2	25
	Total	**24**	**7**	**5**	**19**	**55**	**39**	**55**	**45**	**139**	**31**	**21**	**52**	**245**

Appendix B – Detailed concepts for themes analysed

Theme A1 – Alternate uses of the Internet / different surfing objectives for users / the possible impact of broadband on Internet usage

	CONCEPTS
1	Different website have different objectives / the way you design depends on website objectives
2	There are new design methods / new trends / new developments
3	Broadband: new technologies - new possibilities - more interactive - more impressive
4	Broadband: more business / people use the Internet more / save time
5	Everything is moving towards the Internet
6	Broadband will change design - more video based / less text
7	Interaction is more important in a playful sense (like web gaming)
8	Broadband: more gaming, more entertainment
9	Broadband: you'll have people talking, less text
10	Broadband: more graphics & Flash

Theme A2 – Reference to principles of conceptual blending used during design

	CONCEPTS
1	Placing of elements is important – layout (text, form, graphics)
2	A site needs to create a unit / graphics must support content & objectives / everything must work together / context is important
3	Experience is an important contributor in design process
4	Use the idea of a visual breather in terms of layout
5	Use metaphor to describe design approaches
6	Get client input
7	Look at & identify examples on the Internet
8	Use a combination of things

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	CONCEPTS
9	Design skills is subtle / unintentional / subconscious
10	Intuition is based on experience
11	Uses metaphor / analogy for people to associate things
12	Rely on user experience to design & know what to put on a website / rely on user background & education to understand design
13	Use examples to access the clients needs
14	Try & learn from success stories
15	Use imagination / imagination plays a role in design
16	Buy brilliant magazines as examples
17	Learn from examples / teach self / ask questions
18	People associate with the human factor/people
19	Smiling people may communicate satisfaction
20	Learn from others / pick up ideas from others
21	See if communicate works by looking at the reactions of others/independent people
22	Design for people to associate
23	Notices the role of imagination in completing an event

Theme A3 – Using intuition / introspection / experience (of self and others) / understand own thinking

	CONCEPTS
1	Experience is an important contributor in the design process
2	Design skills is subtle / unintentional / subconsciously
3	Intuition is based on experience
4	Rely on user experience to design & know what to put on a website / rely on user background & education to understand design
5	Try & learn from success stories
6	Buy brilliant magazines as examples

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	CONCEPTS
7	Learn from examples / teach self / ask questions
8	Learn from others / pick up ideas from others
9	See if communicate works by looking at the reactions of others/independent people
10	Use experience & own perceptions (introspection)
11	Use intuition / goes on what feels right / goes on gut feel / uses common sense
12	Uses introspection - "if I understand it & find it useful then it must work"
13	Get independent input from an external person or company / a person that they trust / an experienced person
14	Use talent / its something natural
15	Graphic design is a creative process
16	Will challenge a design principle to come up with a new idea/principle/trend - to stand out
17	Learn to know client/market / think about who the client might be / think about how the client might use it
18	Diagonal arrangement creates uneasiness / you're going to fall off / difficult
19	Design site that uses colour, lines, & layout to focus attention on important areas
20	Has the ability to explain how the eye moves

Theme A4 – Using principles of visual aesthetics (specific use of elements of VA)

	CONCEPTS
1	Design skills is subtle / unintentional / subconsciously
2	Placing of elements – layout (text, form, graphics)
3	A site needs to create a unit / graphics must support content & objectives / everything must work together / context is important
4	Use the idea of a visual breather in terms of layout

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	CONCEPTS
5	Use a combination of things
6	Create confrontation – get attention – hard edge graphics
7	Placement of graphics is important
8	Eye is lazy – design should lead the eye
9	Use tools to design efficiently – e.g. line / colour
10	A site must arise a person at first glance / entice to explore further
11	The purpose of graphics is to entice
12	Design is an argument / concept
13	Uses psychological closure - give an idea to the user
14	Use Flash, motion, video, sound (various sensory inputs)
15	Attention is attracted by bright foreground / bright light
16	Attention is attracted by colour
17	Attention is attracted by motion
18	Use desaturation of colour to create mood
19	Look at desaturation / B&W to determine whether something will look ok in colour
20	Desaturation communicate calmness
21	Desaturation more status cue
22	Psychology of colour is important – read books about it
23	Use desaturation of colour to emphasise something else

Theme A5 – Conscious awareness of principles of visual aesthetics and its effect on users

	CONCEPTS
1	Attention is attracted by bright foreground / bright light
2	Attention is attracted by colour
3	Attention is attracted by motion
4	Use desaturation of colour to create mood

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	CONCEPTS
5	Look at desaturation / B&W to determine whether something will look ok
6	Desaturation communicate calmness
7	Desaturation more status cue
8	Psychology of colour is important - read books about it
9	Use desaturation of colour to emphasise something else
10	Use knowledge of video edition / observations based on video editing experience
11	Aware of the persuasive ability of advertising
12	Diagonal arrangement creates uneasiness / you're going to fall off / difficult
13	Site uses colour, lines, & layout to focus attentions to important areas
14	Sceptic about website information: its easy to put something on the Internet
15	Movement on general makes you curious about the site
16	Diagonal arrangement would be more energetic
17	Shadows may lead to distrust mysterious / sombre / frustration / appeal to your emotions
18	Aware of artists ability to persuade people – not sure to believe the message
19	Observation on lighting is based on video editing background & photography
20	Shadows & darkness: people get irritated with anything less than normal
21	People are attracted to a bright area / desaturation is more like background
22	Grey desaturated area is depressing

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Theme A6 – Limitations of current design courses / literature

	CONCEPTS
1	Design courses is limited / design literature limited / teaches only the basics
2	Usability literature & web evaluation methods provides a point of departure
3	Books are outdated to quickly / books are limited - not useful

Theme A7 – Design interactive sites / design to get the user involved in the process in general

	CONCEPTS
1	A site must arise a person at first glance / entice to explore further
2	The purpose of graphics is to entice
3	Broadband: New technologies - new possibilities - more interactive - more impressive
4	Interaction is more important in a playful sense - like web gaming
5	Broadband: You can design sites that talk back
6	You need to design interactive sites so that people want to be there
7	Build stuff that want to make them click

Theme A8 – Design is multi-modal / multi-functional / multi-disciplinary

	CONCEPTS
1	Uses knowledge of video edition / observations based on video editing
2	Uses a combination of things
3	Use Flash, motion, video, sound (other sensory inputs)
4	Everything is moving towards the Internet
5	Broadband will change design - more video based / less text

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	CONCEPTS
6	Design principles stay the same no matter the canvas
7	Graphic designers must be multi-functional
8	Designers must know technology
9	Designers must know print & illustration skills
10	Can design conceptually for any media
11	The lines between graphic design/advertising/marketing is blurring
12	Internet & TV is merging due to the development of broadband
13	Like to learn from filmmakers
14	Connection between the client/market & designer
15	Psychology is a subconscious part of the design process
16	Part of design is consultation: give advise; what & why
17	Video design is a different concept / with Flash you need to think differently
18	Observations on lighting is based on video editing background & photography
19	Have done video editing to use the Internet better

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Appendix C – Correspondence analysis figures

Column No / Themes	Coordin. Dim.1	Coordin. Dim.2	Mass	Quality	Relative Inertia	Inertia Dim.1	Cosine² Dim.1	Inertia Dim.2	Cosine² Dim.2
A1	-0.490375	0.099089	0.081301	1.000000	0.131576	0.185482	0.960771	0.016208	0.039229
A2	0.154603	-0.078692	0.195122	1.000000	0.037970	0.044248	0.794233	0.024534	0.205767
A3	0.402631	0.044883	0.231707	1.000000	0.245903	0.356373	0.987726	0.009478	0.012274
A4	0.038089	0.251017	0.146341	1.000000	0.060996	0.002014	0.022506	0.187229	0.977494
A5	0.001435	-0.076305	0.134146	1.000000	0.005052	0.000003	0.000353	0.015859	0.999647
A6	-0.182977	-0.394446	0.044715	1.000000	0.054666	0.014204	0.177081	0.141264	0.822919
A7	-0.337702	-0.592813	0.065041	1.000000	0.195759	0.070372	0.245006	0.464107	0.754994
A8	-0.582639	0.261699	0.101626	1.000000	0.268078	0.327305	0.832123	0.141321	0.167877

Table 1: Column Coordinates and Contributions to Inertia

	Row Number	Coordin. Dim.1	Coordin. Dim.2	Mass	Quality	Relative Inertia	Inertia Dim.1	Cosine² Dim.1	Inertia Dim.2	Cosine² Dim.2
Company1	1	0.560180	0.156223	0.223577	1.000000	0.488940	0.665629	0.927839	0.110793	0.072161
Company2	2	-0.246437	0.097645	0.565041	1.000000	0.256726	0.325569	0.864307	0.109390	0.135693
Company3	3	0.066248	-0.426248	0.211382	1.000000	0.254334	0.008802	0.023586	0.779816	0.976414

Table 2: Row Coordinates and Contributions to Inertia

Kirstin Krauss
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