The differentiated nature of visual power

An investigation into the effect of cultural and educational background in the aesthetic responses of website users

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Abstract

People continuously make aesthetic choices on the basis of the relative power of visual stimuli. With regard to websites, measuring visual power can be used to predict the effectiveness of aesthetic elements in attracting audience attention. Moreover, research suggests that the perception of visual power is not a fixed or universal response; it varies between people of different backgrounds. This thesis investigates the aesthetic elements that make websites desirable for audiences of different cultural and educational backgrounds, and that enable web pages to better communicate information and affective experience. It tests the visual appeal of websites with groups of university students from the disciplines of Communication Design and Information Technology, and from both Australia and Taiwan, investigating variations in affective responses. The investigation adopts Kress and van Leeuwen’s coding orientation for visual modality, that is, abstract coding, naturalistic coding, sensory coding and scientific/technological coding (1996, p. 107). Cleveland (2005) applies these coding categories to ascertain the visual power of magazine design. The present study applies them to four categories of digital design to establish the key factors leading to website preference or selection. A questionnaire using a 10-point Likert-scale established students’ affective responses to the four categories of digital design. The results show that both Dynamic Impact and Aesthetic Appeal emerge as underlying dimensions of visual presentation and that these vary for students of different cultural and educational backgrounds. In measuring and assessing the contribution of web aesthetics to visual appeal, the study serves as a useful reference for website designers.
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Candidature Declaration

I certify that the thesis entitled: The differentiated nature of visual power submitted for the degree of: Professional Doctorate in Design is the result of my own research, except where otherwise acknowledged, and that this thesis in whole or in part has not been accepted for an award, including a higher degree, or any other university or institution.

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Introduction

Contemporary media exposes people to a vast array of visual stimuli (Forlizzi 2002, p. 3). The fastest growing and most prominent media channel today is the Internet, with the advancement of internet technology giving people ready access to a wide variety of information and communication opportunities. The field of Human-Computer-Interaction studies (HCI) has emerged in parallel with the growth of this new media, proposing the idea of “usability” as a measure of the ease with which people complete tasks within a digital environment. However, usability tends to consider only the basic, per formative requirements of website interface design. Usability has become an insufficient criterion for understanding broader and more subtle aspects of users’ needs and preferences in interacting with web-based content. Meeting the expectations and needs of user groups is the key to improved message transfer and communication efficiency (Goguen 2003, p. 8), as well as the holding power of sites. Yet quantifying the aesthetic and affective dimensions of websites, including how audiences perceive them, remains elusive.

“Visual power” may be defined as the degree of visual stimulus emanating from a given design. The notion of visual power ensues from the concept of “Arousal Potential”, which is the extent to which a stimulus is capable of raising arousal (Berlyne 1978). The term visual power was first applied by Baird (1993, p. 94) to rank the power of print media, and later by Cleveland (2004) to the analysis of magazine cover designs. In this research, the quality of visual power is empirically tested with respect to the visual presentation of websites. Visual presentation is a key consideration for website design, as indicated by the sheer breadth and depth of discussion the topic has stimulated (Tractinsky & Lavie 2004; Haig & Whitfield 2001). However, this thesis is interested in the way visual presentation changes the reception or interpretation of the message, specifically for the web-based content. To clarify this further, the main purpose of the study is to examine the relationship between a particular type of visual presentation and the elements that enable it to arouse the attention of specific groups. In keeping with Goguen’s (2003) guiding precept of value centered design, values are the constitutive essence of communities. Group members are able to share their visual experience because it elicits an emotional response.
The research asks a number of fundamental questions of website design. How does the combination of visual elements in a website enable it to trigger a user’s emotional response? This is the crux of the matter when attempting to determine visual power. To answer this question and strengthen the overall effectiveness of communications, the affective characteristics of user groups needs to be understood. Another question to be answered is whether or not such affective characteristics vary between user groups; for example those with different cultural and professional backgrounds. To frame a response I have turned to Kress and van Leeuwen who studied visual modality by organising visual presentation into four categories (1996, p. 107). This research uses their concept of the visual modal category as the basis for measurement of a series of interface designs intended to investigate the characteristics of user groups from different backgrounds. Furthermore, it can be argued that the visual judgments or visual experiences of user groups of different backgrounds are influenced by their exposure to mass media or other factors such as family and educational background (Bourdieu 1987, p. 241). This research explores the contention that user background influences affective responses in different user groups, offering a practical basis for visual design presentation that can improve the quality of future website communication.

Usability is an essential element of website design. Thus, user preference could be a key consideration in all visual presentation. A website designer needs first to clarify the structure of elements that enable the arousal of users. Therefore, the investigations of visual communication design and a user-centered approach will be the main foci of this research, with online instructional materials serving as a case study.
1.1 Outline of thesis

This chapter (Chapter 1) outlines the research topic and relevant issues.

Chapter 2 defines the “visual” and compares the differences between print and electronic media. It discusses universal design elements utilized in the communication design process and the interaction between combinations of visual elements and the users’ affective responses. Website visual presentation in relation to the concept of visual power is investigated in a literature review.

Chapter 3 explains and adopts Kress and Leeuwen’s coding orientation for visual modality and presents online instructional materials as a case study to investigate the power of visual presentation and the varying affective responses among users from different cultural backgrounds.

Chapter 4 describes the pretest and results. The results show that website visual power is determined by Dynamic Impact and Aesthetic Appeal, and that these parameters can highlight the differences in affective responses among users with different cultural backgrounds.

Chapter 5 offers a conclusion and suggestions for further research. Finding a balance between Dynamic Impact and Aesthetic Appeal remains a matter to be solved by website visual designers.
Chapter 2: Aesthetics and the visual power of website presentation

Users access the Internet for reasons of work, business, and leisure. In terms of visual presentation, the browser also offers users an opportunity to enter a variety of websites where visual stimulation is exploited to attract their attention. Designers must analyze user groups to create the most aesthetically appropriate visual designs; users’ cultural backgrounds, age, and gender are pertinent data. A website’s visual presentation comprises universal elements, including space, typography, images, and color. Design elements can be as significant in their presence as in their absence. The choice and arrangement of these elements determines their value as visual designs. The definition of “Visual Design” according to Resnick (2003, p. 16) is “the planned arrangement of visual elements organized and prioritized into a cohesive whole that becomes the visual message”. Elements in a visual presentation are often codified to form a powerful visual message. Gestalt theory assists in the explanation of the codified formations of visual power through exposing its structures. By applying the concept, certain formations of visual elements become a meaningful construction to particular groups of website users.

2.1 Gestalt law and visual power

Human cognition must be understood before this study considers Gestalt theory. This belongs to the field of psychology. Gestalt psychology is a branch of psychology that examines the human cognitive response to images. Therefore, it is a significant knowledge base for visual designers of websites. However, before discussing the meaning of Gestalt, a basic understanding of the development of psychology is necessary. The word “psychology” is derived from the Greek words “psyche” (mind or spirit) and “logos” (study). The etymology of the term indicates that psychology refers to the “study of the mind or spirit”. Psychology has become increasingly systematized, objective, and dependent upon scientific method. Psychology indicates that the mind and body cannot be separated, that “behavior” is produced by the combination of mind and body. Since “behavior” can be objectively observed, observations can be recorded and subjected to quantitative analysis. Therefore, human behavior studies have become a crucial focus of modern psychology (Chiang 2002, p. 124).
Koffka, a Gestalt psychologist, provided a definition for psychology in 1925. He stated that psychology is a science that examines the behavior of organisms as they interact with the external world. There are two dimensions of behavior: firstly, observable responses such as speaking, movements, or measurable biological changes; and secondly, abstract, unobservable responses, such as motivations, emotions, thoughts, and perceptions. Modern psychology focuses upon both inner and outer responses, incorporating observable and unobservable psychological processes. Therefore, psychology is a science studying human behavior and mental processes through observation and measurement.

The Gestalt school of psychology was established in Germany around 1912. Wertheimer (1880-1943) published a paper on “phenomena” that systematically described Gestalt psychology for the first time, and also introduced “grouping”, the primary concept of Gestalt psychology.

The basis of Gestalt theory originates from physics. Numerous prominent 19th century physicists such as Faraday (1791-1867) and Hertz (1857-1894) were highly accomplished in the fields of electromagnetism and gravity. Following numerous experiments, they suggested that there existed electric, magnetic, and gravity fields in the physical world. In these fields, all elements interact according to the sympathetic forces generated in certain forms. If these elements do not attract each other, they repel each other. These forces of mutual attraction are limited by the dimensions, mass, position, and distance of the elements. The visual studies of Wertheimer (1880-1943) were influenced by the physical laws proposed by such scientists. Wertheimer suggested that fields exist in the human visual world that is similar to fields in the physical world. Those in the human visual world are termed “visual fields”; those that are relevant to human life and learning are called “perceptual fields”. Humans perceive these fields and integrate them within their senses. Thus, Gestalt psychology is also referred to as “field theory” (Chiang 2002, p. 128).

Gestalt originates from a German term. Its definition is similar to form, configuration, structure, shape, or pattern in English. However, since these English terms do not adequately express the concept of “the whole” as represented by Gestalt, scholars have
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directly adopted the term Gestalt. The German psychologists Wertheimer, Koffka, and Kohler were the three primary contributors to this field.

In Wertheimer’s visual field theory, the term Gestalt refers to a complete and balanced whole produced by the combination of various forces in visual fields. In other words, the numerous elements of a human visual field attract each other to form a grouping or a mutually repulsing non-grouping. The cognitive theories developed in Gestalt psychology describe the formation of grouping cognition in visual fields. In other words, the human mind operates cognitively to favour groupings, and “the whole is different from the sum of its parts”. For example, our perception of a tree does not arise merely from the sensory information related to shape, color, and size; it also includes our accumulated experiences and impressions of trees. Only after these are integrated, does one perceive a tree.

To establish connections between cognitive elements, the Gestalt school produced the following principles and laws that were termed “Gestalt laws”. The laws are: Figure-Ground, Symmetry, Similarity, Proximity, Closure, Continuity, and Common fate. These visual laws developed by Gestalt psychologists can assist image creators and designers to create bridges connecting different visual elements, providing a path to structuring visual cognition (Chiang 2002, p. 124).
2.1.1 Gestalt Visual design principles

1. Symmetry: The relationship between a figure and its ground; the fundamental law of Gestalt that enables us to identify objects/figures as distinct from their background/ground. This law of perception is dependent upon contrast.

2. Similarity: Visual elements that are similar in shape, size, color, proximity, and direction are perceived as part of a group.

3. Proximity: Items that are spatially located near to each other seem part of a group, while items that are spatially apart are perceived as separate.

4. Closure: Humans have a natural tendency to visually close gaps in a form, especially in familiar forms.

5. Continuity: The human eye seeks the relationships between shapes, and continuity occurs when the eye follows a line, curve, or sequence of shapes, even when encountering negative and positive shapes.

6. Law of Common Fate: Elements with the same moving direction are perceived as a collective or unit.

The above concepts can not only be applied to the phenomenon displayed by visible visual elements, but can also be extended to the analysis of human society and lifestyles. For example, in terms of aesthetic value judgments, when people respond to received visual messages their responses are frequently based on the level of familiarity of their life experiences. This familiarity originates from various recognized evaluation models that accumulate throughout daily life. These also include experiences of visual aesthetics, which allow the subconscious aesthetic patterns to modulate visual presentations. These models of aesthetic judgments are similar to the Gestalt principles. Therefore, a powerful visual presentation on a website must match the users’ aesthetic patterns.

2.2 Cognitive Responses

This study begins exploring the cognitive responses of website users - known as their “cognitive response”. This stemmed from research on attitude changes that began in the 1930’s. A change in attitude was linked to learning, perception, function, and consistency. Theories on attitude were amalgamated in the late 1970’s by Greenwald and named “cognitive response”. One significant factor related to the study of the
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visual design of websites is “affective responses”, which can be classified into the three dimensions of interests, attitudes, and emotions. (1) Interest refers to whether users will continue to actively watch the media. How to rouse user interest has become an important reason why designers first study and understand user characteristics. (2) Attitude also plays a vital role in the cognitive domain since people have a low degree of acceptance towards changing existing attitudes, similar to grouping or non-grouping concepts. Non-grouping elements have the characteristic of mutual repulsion. Thus, the driving force of attitudes on perception has a crucial influence. (3) Through a combination of visual elements, user emotions can be aroused and subsequently affect their attitude. This is the role that emotion plays in visual design; visual design that can arouse emotional reactions is more effective than non-emotional design. These three dimensions may influence cognitive judgments. The cognitive judgments are evaluations of an item based on a user’s previous experiences with other similar items, also known as the “cognitive pattern” of the user, which has its equivalents in Gestalt theory. Therefore, exploring the connection between visual elements and emotions is a focus of this study (Chiang 2002, p. 57).

2.3 The Phenomenon of Perception

As described in the previous section, a user’s cognitive pattern builds on previous experience. However, when users encounter a completely new visual presentation, they are unable to perform simple classification of the visual experience. This is primarily due to an individual’s inability to form effective connections with the unfamiliar visual input messages and the data inside their brain’s memory bank, or due to the insufficient strength of the signal itself (insufficient clarity). In these situations, lacking “perceptual readiness” is extremely difficult to reconcile with experience and resonance.

Perceptual readiness is a type of decision-making process for classification behavior that creates connections with pre-existing messages through the course of evaluation, judgment, and response. Therefore, the perceptual system processes include perceptual experiences, memories, and responses.
As stated by Bond (1987), the cognitive capacity of an adult does not appear suddenly, but evolves through an orderly process of development. The fundamental characteristic of cognitive development is that a person experiences an increasing number of stimulus conditions while processing a particular stimulus. During this cognitive development, a person also develops a growing appreciation of behavioral rules. The primary assumption of the simultaneous processing model indicates that stored behavioral rules affect a person’s behavior (Bond 1987, p. 84).

One such behavioral motivation of humans is aesthetic judgment. A visual presentation in Communication Design comprises an arrangement of space, typography, image, and color. Designers should be aware of the patterns that constitute codified formations. Most designers manipulate patterns of expression through experience and observation, but research is required if designers are to be surer of the relationships between the user and the response to the website.
2.4 Aesthetics and visual power

Aesthetics has long been a topic of philosophical discussion and constitutes a field of study that crosses over from philosophy into the fine arts. This is a complex field of study that goes beyond the scope of this thesis, but the basic statement may be made that aesthetics are derived from the things that give us pleasure, enjoyment and beauty. This is a difficult area precisely because these qualities of experience are so subjective. Our experience of the world, of which the world wide web is an excellent example, demonstrates that there are many aesthetics and that these might appeal to people of different cultures, ages, classes and gender. As such aesthetic appeal is one of the least understood but most important components of visual communication design. Visual power is one of the few concepts developed to understand the nature of visual appeal in media design and will be explored in this chapter in relation to Human Computer Interface design (HCI).
2.4.1 Levels of noise: Aesthetics in the field of Human-Computer-Interaction (HCI)

Aesthetics is defined by Postrel (2003, p. 6) specifically in its relation to the development of HCI design:

“In this context, aesthetics obviously does not refer to the philosophy of art. Aesthetics is the way we communicate through the senses… Aesthetics shows rather than tells, delights rather than instructs. The effects are immediate, perceptual and emotional. They are not cognitive, although we may analyze them after the fact. As a mid-century industrial designer said of his field, aesthetics is fundamentally the art of using line, form, tone, color and texture to arouse an emotional reaction in the beholder…”

Thus, a visual presentation carries a type of “emotional response”. Over recent years, aesthetics has risen to prominence in the Human-Computer-Interaction (HCI) field. For instance, Tractinsky (2004, p. 11) argues that:

“Aesthetics is relevant to information technology research and practice for three theoretical reasons. (1) For many users, other aspects of the interaction hardly matter anymore. (2) Our evaluations of the environment are primarily visual, and the environment becomes increasingly replete with information technology. (3) Aesthetics satisfies basic human needs, and human needs are increasingly supplied by information technology”.

According to Tractinsky, the perceived usability of a web site is influenced by its visual appeal because appealing sites seem easier to use; the terms pleasing and appealing have become important for HCI.

In the area of computer interactive design, experts and scholars have been seeking a more comprehensive way to improve the quality of the user experience. Alben (1996) has identified eight criteria that attempt to capture and describe aesthetic experience in relation to the complex of factors that are important to HCI: Understanding of Users, Effective Design Process, Needed, Learnable and Usable, Appropriate, Aesthetic Experience, Mutable and Manageable (Alben 1996, p. 12). Aesthetic experience has become an element with bearing on the quality of user experience, but one that must also be seen in relation to a wide complex of significant factors.
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As a field of study, aesthetics was originally coined by Baumgarten in 1735 to refer to the philosophical pursuit of laws pertaining to art and has spawned a vast literature in philosophy and art theory (Rée 1999). In the late nineteenth century psychology entered the fray. With the publication of Zür experimentalen ästhetik (1871) and Vorschule der ästhetik (1876), Fechner, the father of experimental psychology laid the foundations for another field termed experimental aesthetics, and provided methods for empirical research. Aesthetics was the second published area of experimental psychology, preceded only by psychophysics.

Within this scientific tradition was Berlyne, a psychologist, who probed the field of experimental aesthetics (Berlyne 1971). He developed the concept of aesthetic cognition, in which he defined powerful stimuli as having arousal potential. This refers to the “psychological strength” or “intensity of a stimulus” and represents something like the overall power of a stimulus to excite the nervous system, to command attention and the potential to influence behavior (Berlyne 1973, p. 14).

According to Berlyne (1971), three types of stimulus properties contribute to arousal potential. Steenkamp et al, in a discussion of Berlyne’s work, outline these as follows:

1. Psychophysical properties, which depend on the physical and chemical characteristics of the stimulus, e.g. levels of noise and brightness of color.
2. Ecological properties, which refers to events taking place around us, and in which social factors would be accommodated.
3. Collative properties (novelty, incongruity, complexity), which, for their motivational
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effects to occur, depend on comparison, or collation, of various stimulus elements with each other or with previous experiences (Steenkamp et al. 1996, p. 320).

Berlyne takes his definition of arousal further in “Pleasure, Reward, Preference” (1973, p. 15), using the term arousal level to refer to both external stimuli and internal events. Berlyne links this to the perspective of visual communication, where the power from external stimuli such as visual attractiveness provokes “an overall power to excite the nervous system/to remind one’s internal inspiration/incentive, to command attention, and to influence behavior” (Berlyne 1973, p. 15). In other words, when designing websites, the designer must present visual content that appeals to the affective responses of a particular user group, improving the overall quality of the user experience.

2.4.2 Levels of noise: the construction of visual power

According to Berlyne, three types of properties induce arousal: psychophysical, ecological, and collative. Collative sensations include variables such as familiarity-novelty, expectedness-surprisingness, simplicity-complexity and clarity-ambiguity and are bound up with relations of similarity or dissimilarity, concordance or discordance among the stimulating elements, whether perceived together or at different times. Berlyne’s position found support from neurophysiologic studies indicating that arousal levels activated pleasure and aversion centers within the brain (Olds and Milner 1954). In relation to design, Berlyne’s model posits that we should seek exposure to novel or new experiences that attain a desired level of arousal. However, in line with Berlyne’s model, such experiences should not be so novel as to extend beyond an intermediate level, otherwise they are experienced aversively. To be effective, novelty must be founded in the familiar (Whitfield 2005).

If understood in terms of arousal level, the term Visual Power can be defined as the power to visually arouse, with stimuli producing an appropriate increment of arousal.
2.4.3 Visual preference in visual communication design

Berlyne’s experimental aesthetics derived from studies involving people responding to stimuli that could only be encountered in an experimental situation. Many discrepant findings emerged. Whitfield and Slatter (1979, p. 66) advanced the “Categorical model” to account for these.

“They explained the effect of categories on people’s aesthetic responses by adopting a cognitive interpretation, as opposed to Berlyne’s motivational approach. They argued that objects are not evaluated per se, but rather are judged in relation to the cognitive category accessed. Effectively, stimuli are processed via categorical mediation, meaning that the way people respond aesthetically to objects will be determined by the categories they already have developed for understanding such objects—after all, this is how perceptual cognition operates.”

Whitfield and Slater’s model describes the ability to categorize familiar things as a natural human capability. Whitfield (2005) in Aesthetics as Pre-linguistic Knowledge: A Psychological Perspective introduces the “Categorical-Motivational Model”, and advances the notion of aesthetics as an important aspect of pre-linguistic cognition - a form of “knowing” that preceded the evolution of language. Whitfield argues that the function of aesthetics is to elaborate the categories by which we understand the world, by attaching emotion to sensory perceptions.

Shusterman (1992) argues that aesthetic experience is a spontaneous and immediate satisfaction that comes from perception rather than a mere inference. In The Substance of Style, Postrel describes aesthetic understanding in relation to society and culture: “Aesthetic effects begin with universal reactions, but these effects always operate in a personal and cultural context.” (2003, p. 6) She writes:

“Modern design was once a value-laden signal – a sign of ideology. Now it’s just a style, one of many possible forms of personal aesthetic expression. “Form follows emotion” has supplanted “form follows function”… Aesthetics offers pleasure, and it signals meaning. It allows personal expression and social communication. It does not provide consensus, coherence, or truth.” (2003, p. 9)

In most theories of aesthetics individual variations are connected to the highly personal nature of aesthetic experience. Robertson, in his study of The Sign in Graphic Design describes aesthetic judgment after Eco (Eco 1976, p. 275) as dialectic between acceptance and repudiation of the senders’ codes. Robertson describes this process as a continual fine-tuning which might, at its most general, represent the basic binary position of me/not for me and end in a “particular appropriation of specific values
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inscribed in a particular object”. (Robertson 2001, p. 72) Such a position can be viewed as the pragmatism of aesthetics. Norman (2004) subscribes to pragmatic aesthetics. He believes that products need both to be useful and beautiful since it feels much better to work with attractive products; the emotional response, rather than philosophical or interpretive reaction, is of most importance in his assessment.

How can we ensure that we are properly able to specify visual experience from the many elements that make up a visual presentation? Studies have suggested that human susceptibility to aesthetic stimuli can be traced back to childhood (Kogan 1994, p. 140). Kogan points out that the educational and cultural background of an artist determines both the content and style of his or her artwork. The same holds for the audience, to whom all creations do not have the same meaning; many properties influence judgment.

According to Bell (1914, p. 4):

“...The starting-point for all systems of aesthetics must be the personal experience of a peculiar emotion. The objects that provoke this emotion we call works of art. All sensitive people agree that there is a peculiar emotion provoked by works of art. I do not mean, of course, that all works provoke the same emotion. On the contrary, every work produces a different emotion. But all these emotions are recognisably the same in kind...and if we can discover some quality common and peculiar to all the objects that provoke it, we shall have solved what I take to be the central problem of aesthetics... What is the quality common and peculiar to all members of this class?”

The judgment of anything depends on interconnected personal visual experience. That is to say, the judgment is enacted with a particular evoked emotion. Bell would expect that aesthetic judgment will vary depending on the audience, but we are also curious to know what other factors may be involved. Design is an important component of these “other factors” as it is nearly always about presentation or display systems that function to make particular information appeal to particular audiences.

For Bell, “Significant Form” is one possible answer, encompassing, as it does for him, combinations of lines and colors that stir our aesthetic emotions (1914). Both Bell and Kogan suggest that the appreciation of any piece of art is influenced by a specific educational and cultural knowledge and familiarity. This means that there is an interactive relationship between the artist/designer, the artwork and the audience. When the three factors interact, the artwork will be imbued with an emotional resonance complementary to the affective responses of the audience. Bell’s theory is
helpful in constructing the foundation and concept of aesthetic preference. He emphasizes that any individual will emotionally correlate aesthetic value with his or her own aesthetic experience, which can also serve as the basis for evaluating the affective responses of viewers.

Some scholars disagree with Bell. For example, Pateman et al. (1991) maintain that Bell only focused on the structural elements of artworks. For them, “The Significant Form”, is hampered by its inattentiveness to the rationale behind the construction of these elements. In “The Significant Form” an important relationship is exposed between a particular form of presentation or display system and its relation to a user’s visual experience; the form must be familiar to the user. Following Bell, there are other properties that trigger aesthetic response. Responses to a work stem from particular preferences, and therefore knowledge of visual preferences can assist designers to make informed decisions when choosing visual elements; such knowledge can provide a predictable and reliable understanding of certain social or personality types.

Fogarty et al (2001, p. 141) describe
“…the primary purpose of an information display is to convey information. If information displays can be aesthetically interesting, that might be an added bonus.”

However, “aesthetically interesting” is not just an added bonus; it has become the central issue of visual communication. If we are unable to identify the audience’s particular aesthetic values, then communication is less effective. Understanding the realm of aesthetic preference has clearly become an important topic for modern communication design. Effective design should not be seen as simply an added benefit, or byproduct of the designer’s skill or sophistication. The visual experience of the audience must be considered, and their aesthetic expectations met.
2.4.4 Cross cultural visual perception

Culture can be generically referred to as the capacity for learning and sharing information on a social level. This enables collective knowledge to accumulate that differentiates one society from another. As a descriptive term it also refers to the specifics of knowledge that are learned and shared (Blount & Schwanenflugel 1993).

Chinese reading behavioral rules provide an interesting cultural difference to those of the West. The rule of Chinese writing is that characters are read and written from top to bottom and from right to left. This rule was established during the early Shang Dynasty between 1766 B.C. and 1122 B.C. The Shang inscriptions on bones or tortoise shells were carved using knives and arranged on the materials according to their texture. After the Shang Dynasty, other materials, such as leather, bamboo strips, or paper, replaced the bones and tortoise shells, and this writing rule was retained for over 3,000 years (Chang 2001, p. 5). More recently, the Chinese language has been influenced by Western culture and digitization; nowadays, both vertical and horizontal writing is acceptable (Chen 1981). Notably, however, this development has significantly affected the cognition of Chinese people. Hoosain declared in “Perceptual processes of Chinese” that to read a Chinese newspaper or book, one must know 214 basic Chinese character components /radicals. Compared with the 26 letters of the English alphabet, reading Chinese characters requires a significant ability to memorize (Vernon 1982). The eyes are controlled by three pairs of oculomotor muscles, and vertical eye movements require more complicated coordination of the muscles than horizontal movements do (Schiffman 1976). This suggests that the path of visual movement impacts upon information reception and cognition. Additionally, since Chinese characters are the product of simplifying and combining images, the use of Chinese characters greatly benefits image identification and spatial discrimination training. When Bond utilized the non-verbal methods of Raven’s Progressive Matrices to test for complex image identification abilities, he found that test subjects who could read and write Chinese scored significantly higher during the test than subjects who could only read and write alphabetical languages. The visual behavioral patterns of groups that read and write Chinese engage primarily in holistic perception (Bond 1987, p. 26). As the Japanese philosopher Hajime Nakamura noted, Chinese people rely on their sense perception and trust in their intuition. Thus, the impact of Chinese reading
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methods is also a key point of consideration for future discussions of visual preference cognition.

It is acknowledged that while the physiology underlying visual perception is common to all humans, the cultural habitat in which they reside exerts influence upon their use of this physiology to interpret the external world. As such, there are clear differences due to cultural upbringing. This is the domain of cross-cultural psychology and anthropology. While this is outside the scope of the present research, it is useful to exemplify this by reference to traditional Chinese versus Western styles of reading. And in particular, how Chinese reading has had to adapt to the dictates of a more dominant cultural technology, the World Wide Web? The Western technology uses horizontal reading, while the traditional Chinese used vertical reading. This difference placed those who favour non-horizontal reading in a distinctly disadvantageous position. If the World Wide Web uses horizontal text, and if the content is of sufficient importance, then they must adapt to the new technology. This has taken place and will no doubt continue until a shift in dominance occurs. Certainly, for major cultures such as the Chinese, this may be possible; however, for less populated and technologically dominant cultures such as those of Cambodia and Thailand, each with their own languages and styles of writing, this is unlikely to occur. For this reason they will most probably veer towards cultural acceptance of the prevailing technology, and its cultural influence. In other words, they will learn to read English from left to right.
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2.4.5 Aesthetics and visual power

The term visual power was first defined by Baird (1993, p. 94) to describe the richness of visual presentation in print formats; it refers to the degree of visual stimulus emanating from a visual presentation. The stimulus must come from an arrangement of visual elements (Space, Typography, Image and Color), which can be sub-divided into a range of styles, categories or genres. The World Wide Web now contains a dizzying array of visual stimuli. Thus, the challenge for website visual designers is to effectively categorize and select visual elements for design work that meets users’ preferences and needs, to generate focused visual presentations that interest users. From this point of view, it is necessary to apply the term visual power to website visual presentation. Affect is the general term used for the judgment system that comes into play, whether conscious or subconscious. The affective system makes judgments that help people quickly determine which aspects of an environment are good or bad. Usually, affect accompanies the preferences that influence users’ visual arousal.

Cleveland (2004) used visual power in the context of an analysis of magazine visual design. He applied the analytical method from linguistic structures to understand the relationship between visual language, visual grammar and visual power. Even though semiotics is a field derived from linguistics, it has been extended to other fields, such as media studies. The structured system in the domain of linguistics is understood as grammar: a pattern of signs that reflects accepted common usage. Communication is always mediated by signs, which always occur in structured systems of related signs (Saussure 1976). However, as Halliday reminds us:

“Grammar goes beyond formal rules of correctness. It is a means of representing patterns of experience. It enables human beings to build a mental picture of reality, to make sense of their experience of what goes on around them and inside them.” (Halliday 1985, p. 101)

By extension, the concept of grammar is applicable to the visual presentation of websites. This concept is useful when exploring visual experiences in and amongst particular user groups. Consequently, a visual preference is a pattern drawn from their visual experiences. In addition, Kress and van Leeuwen (1996) state that verbal language no longer dominates our interpretation of visual communication. Although their idea of visual language comes from linguistics, a distinctive visual grammar is
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outlined in Reading Images: The Grammar of Visual Design. According to the analysis of the icon (Goguen 2003, p. 8), also indicates that it is often important to view some signs as representing other signs. This motivates the study of representation, including what makes some representations better than others within particular user groups.

A website’s visual presentation has the power to gain the attention of a user group if the presentation matches the group’s aesthetic values. Social groups form around shared values and information. The website visual designer needs to acknowledge the patterns of a user group’s visual experience in order to successfully trigger an emotional response. The present study adopts Kress and van Leeuwen’s (1996) visual classification as a model to identify the relationship between a user group and the visual stimuli of website presentations.

Kress and van Leeuwen’s visual classification are:

**Scientific/technological-coding orientations:**
The representation of a diagram in which colour represents low modality.

**Sensory-coding orientations:**
Hedonistic pleasure is used as a dominant feature while colours are used to heighten modality for its psychological effect.

**Abstract-coding orientations:**
The production and reading of text and images is determined by a code marked by social distinction or a member of the social group or class.

**Naturalistic-coding orientations:**
The dominant code used by society, this is the code most of the members may use regardless of education or social status.

It should be noted that the classification serves as a convenient indicator of styles of presentation only. The research undertaken was expressly to test for differences in responses to visual presentation, and not to validate Kress and van Leeuwen’s typology.

Emotion is the conscious experience of affect. Affect might be caused by the recognition and identification of particular objects. The feelings you might experience, without necessarily knowing why, is affect. Emotion and affect influence one another. Most importantly, affect and emotion are crucial for users’ everyday decision making. According to Norman (2004), the affective system provides critical assistance in
decision making by helping you make rapid selections between good and bad, reducing the number of things to be considered. This will lead to the situation in which most of us just decide on something, but if asked why, often don't know: “I just felt like it.” one might reply. Affect plays an important role in preference. If these reactions happen frequently and are part of the experience of emotion, habits form. When people feel good or bad about something without knowing why, they can listen to the body, to the wisdom of its affective system. In all, affect, which includes emotion, is a system of judging what is good or bad, safe or dangerous. It makes value judgments that support survival. The affective system also controls the muscles of the body and, through chemical neurotransmitters, changes brain functioning.
2.5 Aesthetic function in visual communication design

Frascara (2004, p. 58) describes visual communication design as organizing information to form a visual message that can attract and retain the attention of viewers. Attracting and holding a viewer’s attention can be achieved in a number of ways, yet communication always relies on a restricted range of design elements, earlier described as space, typography, image, color and materials. The power of the visual elements might be maximized using extremely large letters or vivid colors. The advertising world is already saturated with visual stimuli using various methods to gain viewers’ attention and this can occur in a wide range of media such as motion pictures, magazines, and posters, encountered in everyday life (Featherstone 1991, p. 114). Baudrillard (in Featherstone 1991, p. 68) draws further attention to the overloading of information from contemporary media. He warns of reaching saturation of images and fears the development of overload resulting in an inability to process. Extrapolating from Baudrillard’s view, it can be said that designers who randomly insert large amounts of so-called “powerful visual elements” into design may fail to attract or retain viewers’ attention. Visual elements, expected to retain the attention of viewers, should be designed carefully and used sparingly to maximize affect. An effective visual presentation requires the selection of cohesive visual elements to form a powerful visual message in order to achieve the goal of visual transmission. We therefore need to codify those cohesive visual elements.

Codes of visual presentation only have meaning if they are recognized by the user. It is essential that the user can recognize the relationship between the arrangement of visual elements and the visual message. Metros further states that:

“Graphic design manages complex and disparate types of information through order, abstraction, simplification, grouping, coding, prioritizing, and assigning relative value to different types of information... Graphic design does more than gain the attention of the user, it provokes an intellectual and emotional response that greatly enhances the end result…”(Metros 1994, p. 28)

While the emotional response of the audience is clearly the most important point for any graphic presentation, most designers present information according to their own personal preferences and aesthetic judgment. This may not be the most appropriate aesthetic for the audience or a particular group of website users. The power of visual
presentation to gain the user’s attention may be diminished. The means of addressing such deficits is to take into consideration the audience’s preferences and background.

To attract audience attention is not only a property of visual communication design. The message might be presented as text, in a particular media context, and be influenced by dispositions created by education, class and family upbringing. In summary, the interest and attention of an audience is a complex product of social relationships. In *The Sign in Graphic Design*, Robertson (2001) concludes that visual elements such as space, font, image, color, and materials deliver, through their arrangement, the value created by visual language in visual communication. This value also includes consensus among the target audience group. When designers understand this, their visual elements can communicate with the audience and become assimilated into their visual culture in order to “provoke an intellectual and emotional response.” (Robertson 2001, p. 73)

Featherstone (1991, p. 68) points out that we, in the new postmodern age, are now totally “aestheticized”. This, he explains, has come about not only through even higher media-saturation but through the mediation of our bodies, lives and relationships, activities previously defined as private that are now colonized by commerce and services. Viewers construct various visual values through family, education (Bourdieu 1987, p. 243), and life experience (Featherstone 1991, p. 90). Bourdieu’s theory of Cultural Capital comprises three subtypes: embodied, objectified and institutionalized. He originally applied the theory to differences in educational consequences. This theory has since been developed and used to explain other social structures, extending to everyday personal interactions. As with Featherstone’s argument that aesthetic judgment now pervades most of society and most areas of people’s lives, it may be said that we are expressing an entirely culturally learned and actively manipulated system of values. Bourdieu (1987, p. 243) points out that it is difficult to escape the visual stimuli of the mass media which permeates our entire culture. This ubiquity can result in the naturalization of certain values in information, and can also foster the development of particular forms of presentation for specific audiences. When the audience appreciates a visual presentation, the work may be considered to have created a special visual experience of value to the audience.
Norman (2004, p. 138) provides some suggestions for visual designing.

“Humans are predisposed to anthropomorphize, to project human emotions and beliefs into anything. On the one hand, the anthropomorphic responses can bring great delight and pleasure to the user of a product. If everything works smoothly, fulfilling expectations, the affective system responds positively, bringing pleasure to the user. Similarly, if the design itself is elegant, beautiful, or perhaps playful and fun, once again the affective system reacts positively. In both cases, we attribute our pleasure to the product, so we praise it, and in extreme cases become emotionally attached to it. However, while the behaviors frustrating, and the system appears to be recalcitrant, refusing to behave properly, the result is negative affect, anger, or worse, even rage. We blame the product. The principles for designing pleasurable, effective interaction between people and products are the very same ones that support pleasurable and effective interaction between individuals.”

Norman’s concept that positive affect supports effective interaction is particularly useful in relation to communication design. If a design is aesthetically meaningful to the user, it will have emotional appeal and be more effective (Whitfield 2000, p. 8). As we shall see in this research, the audience makes this connection through visual preferences.
2.6 Website visual presentation

New media theorist, Jesse James Garrett emphasizes the importance of visual presentation in a web user’s experience, seeing visual design or presentation as the major element of the communication process (Garrett 2003, p. 33). He adds that visual design is placed in the first level of user experience when encountering a website (see Figure 2). Although visual design is positioned at the top of the hierarchy of a web user’s experience, this does not mean that visual design is unaffected by other structural and strategic ingredients that are integral to website design. Garrett points out that successful website design is a combination of professional disciplines and visual elements working together through careful consideration and harmonious collaboration. The position of Visual Design in Garrett’s figure clearly shows how important visual representation is in connecting with the users in the most direct manner. When web visual presentation fails to impress users, their reception of the website’s content will be significantly reduced. As a result, the efforts of other professional disciplines contributing to a website design will also be overlooked.

Figure 2: Web Information Architecture
Source: The Elements of User Experience: User-Centered Design for the Web (Garrett 2003, p. 33)
As shown in Figure 2, web information architecture includes several disciplines such as information, interface and navigation design, along with cognitive psychology. Visual design has been listed at the top of this figure as the most immediate experience. One of the chief functions of communication design is the ability to integrate all of these complex levels of information and turn them into an integrated and effective delivery system.

Maeda (2006) presents “Ten laws of simplicity” which are able to further expand Garrett’s idea. They are:

1. Reduce: The simplest way to achieve simplicity is through thoughtful reduction.
2. Organize: Organization makes a system of many appear fewer.
3. Time: Savings in time feel like simplicity.
4. Learn: Knowledge makes everything simpler.
5. Differences: Simplicity and complexity need each other.
6. Context: What lies in the periphery of simplicity is definitely not peripheral.
7. Emotion: More emotions are better than less.
8. Trust: In simplicity we trust.
9. Failure: Some things can never be made simple.
10. The one: Simplicity is about subtracting the obvious, and adding the meaningful.

In the web information architecture, it is always containing a variety of messages. A capable visual designer needs to reduce the complex visual messages and connect with users’ cognition in order to build a powerful visual presentation. These ten ways are helpful direction for web visual designers.

It is in the user’s aesthetic judgment that the social and the psychological collides and if this can be harnessed through visual communication design then the chance of truly affective communication can take place. Visual preferences are formed in daily life. This act of forming preferences is called evaluation, as visual experience includes both positive and negative influences. When people evaluate through visual representation, it implies that they have enacted a visual preference from their visual experience, described by Featherstone (1991, p. 67) as “the third sense of the aestheticization of everyday life”. Forlizzi (2002, p. 3) also insists that a user’s affective response is one of the most important aspects of usability in web design given that, “…users have a lot of exposure to the constant stream of visual stimuli and diverse experiences responding to a world of designed messages.”
Noble (2005, p. 52) also shares this point of view:

“… as contemporary cultures are saturated with displays of visual communication, in the form of advertising, information graphics, site-specific visual identities and images related to entertainment or decoration. If a piece of graphic communication is to be displayed within this arena, the designer needs to be aware of how it relates to competing messages, and how the problems of image saturation or information overload might be resolved in order to communicate effectively.”

According to Forlizzi and Novel, modern people are living in an era characterized by an information overload and consequently are suffused with unprecedented visual clutter. Therefore, now more than ever before, visual communication designers have a responsibility to organize and establish an appropriate visual representation method, particularly in relation to the on-screen display of visual information.
2.7 Visual presentation in cross media

The computer has undergone rapid development and as with the introduction of any new popular media such as radio or television before it, people understand new information technologies according to their previous life experiences. Douglas Adams (1979) author of *The Hitch-hiker's guide to the Galaxy* recognized this tendency:

“First we thought the PC was a calculator. Then we found out how to turn numbers into letters with ASCII — and we thought it was a typewriter. Then we discovered graphics, and we thought it was a television. With the World Wide Web, we've realized it's a brochure.”

Adams’ description evokes a common perception of ever-changing computer technology. The definition of the PC has changed from a calculator, typewriter, TV to an abundant electronic catalogue. In addition to changing our lifestyle, the computer has also evolved into a highly versatile channel of information communication. The presentation of instructional materials in this medium has been influenced by older technologies, evolving from hand-written manuscripts, the mass printing of books, up to the common use of online instructional materials in universities in recent years. Each stage, from email to blogs and RSS, has significantly influenced the communication of knowledge in our society. Through these changing media forms we can map the development of our technological civilization and appreciate the versatility of the current digital media that has had such a significant impact in recent times. In response to the power of computer technology, each domain needs to keep up with the responses of users, analyze its current status, thoroughly understand future developmental trends, and adjust priorities accordingly. Though the presentation norms keep changing over time and tend to become more and more sophisticated, audiences or readers increase their expectations with these trends. Understanding users’ needs remains the primary task of visual communication designers. Changing media priorities also remind us that our learning and experience are complex and happen throughout our lives.

The elements of website visual presentation include the utilization of space, fonts, image and color. The purpose of visual communication design is to use these elements in various combinations to convey messages. In terms of the design process, the arrangement of web page elements by designers should give latitude to relatively spontaneous systemic arrangements capable of adjustment on a case by case basis. The logical alignment of these visual elements must be ensured in order to give visual continuity to each “site” publication. The logical alignment of visual elements is crucial for the operational
recognition of users, not least in helping them to discern the information they need from particular web pages as well as the instant recognition that this page belongs to a particular website and is different from others.
2.7.1 The similarity and difference between printing and Web

In visual communication, the design elements (space, typography, image, color and materials) are used in various combinations to convey messages. Designers should pay attention to the relations of these visual presentation elements in web pages and keep the organization of these components controlled in a systemic layout. In any website, designers should try their best to maintain stylistic wholeness, coherence and continuity. Designers also need to consider the interactions between users and these visual elements while browsing web pages, as the alignment and combination of visual elements plays an important role in the users’ recognition. The combination of visual elements can also assist users to distinguish one web page from another.

2.7.2 Visual elements in a graphic visual presentation

Websites need to be functional but they must also engage users. In particular, the visual presentation of a website gives users their first impression of the site and is therefore critical in setting up expectations, even influencing whether users return. Given the millions of sites available to users, website owners are keen to understand how to attract users, keep them on their site and provide an experience that they will want to repeat. Compared with print media, as a relatively new media, the website has its own features. Greater access ability and potentially large numbers of viewers generates stronger competition and therefore it is even more important to improve visual experience. Visual elements are the basic units for visual effect. Besides the traditional elements mentioned above, the web has, through convergence and development, adopted new and attractive elements of presentation such as animation and multi-media convergence. And even interactivity with the user. Much research exists concerning the effects of mass media on viewers, and how the public uses mass media for their own purposes. Until recently mass media has taken the form of television and radio programs, film, video, and graphic art via hardcopy in magazines and newspapers. Many aspects of visual communication design have evolved and been consolidated in the print media and indeed, print media still exists and remains influential alongside the web. However, the web is developing its own forms and needs to develop its own solutions and adaptations to meet new information demands and permutations.
Design is a visual language that is built on fundamental principles and visual elements. The principles are the organizational rules used in conjunction with the elements to create order and visual interest (Evans & Thomas 2003, p. 3). Evans and Thomas (2003) show that individual elements such as color, logos, typography, etc. work together by using the principles of layout to create design. Resnick (2003) defines design in a modern manner as the “art” of communication. …to inform, educate, influence, persuade, and provide a visual experience—one that combines art and technology to communicate messages vital to our daily lives. It is simply a cultural force (Resnick 2003). Bennett (2006) suggests that art-based elements such as contrast, hierarchy, repetition, and alignment are principles already proven through experimentation. These art-based principles have been tested and retested through professional practice so many times that they should be considered basic principles of design (Bennett 2006).

Given that people tend to define new things through previous experience, we must first analyze the visual elements in printing materials to then understand the role of visual elements in online instructional materials, the forms and sizes of printing are versatile including single labels on bottles, books and even large outdoor advertising hoardings. The contents of printing can be divided into five categories: 1. Space, 2. Typography, 3. Image, 4. Color, and 5. Materials (Robertson 2001, p. 73). The practical application of these elements will be illustrated through some contemporary examples from commercial culture.
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**Space**

In the first chapter of *The Elements of Graphic Design*, White (2002) provides a lengthy discussion of the utilization of space. In the three Haigh’s Chocolate examples above, the elegant use of space reinforces tradition and respectability throughout the publication. Space is used similarly across their various presentation platforms, from print to web pages. Robertson (2001, p. 73) sees layout grids as integral to users’ preferences for particular styles of design: “Layout grids transmit meaning by providing a context to the relationships of the other elements of the design”. The grid determines the internal divisions of a page and defines the text area within an invisible frame. Contemporary page layout design has begun to change the rules towards a more multi-functional, multi-grid system.

**Typography**

Typography is the choice and arrangement of text. People do not like information or a website in one big lump! The designer divides it into sentences, headings, paragraphs, chapters, and sections. Good typography should attract viewers to the website. Bad typography drives them away. The key to selecting appropriate typography on the web is to escape traditional type definitions and to focus on what makes a document readable. This is particularly relevant given that the web is different from print. Typography on the web must recognize the pixilated and radiant qualities of the monitor screen, which may affect the choice of face and line length. Generally, the issues and their solutions are different from those relevant to print. This may be as simple as the need to take a newsletter and uphold a similar identity on the web browser. It may include the use of custom symbols (although these can also be accommodated by small graphics on the web page), or different alphabets.

Typography is a part of graphic design used to convey a message through the structuring and arranging of visual language (Baines & Haslam 2002). Typography is comprised of typefaces and fonts. The terms typeface and font often are used interchangeably, but Baines and Haslam (2002) define typeface as a set of fonts of related design and font as another name for the weight or style of a typeface. In basic terms, typefaces can be divided into two categories: serif or sans serif. A serif is the “cross stroke at the end of main strokes of a specific classification of type design called “serif types” (Wagner 2006, p. 97) such as Times New Roman or Bookman. Sans serif typefaces do not have these
additional strokes. Examples of sans serif typefaces include Helvetica and Verdana. Using typography in Website design is different from using typography in print. In print, serif typefaces are useful for large bodies of text for easier readability, however on screen, the detail of the serif stroke often looks rough because of the low resolution of some computer monitors (Bickner 2003). Sans serif typefaces in print ads are usually reserved for headlines and other bold elements, while online their clean lines offer high readability and are perfect for body copy on Web sites (Bickner 2003).

As part of graphic design, typography is more than words on a page or typeface: it is part of the overall layout. “Typography is the art of printing with type and involves the style and layout of printed material.” (Sprankle 2001, p. 42) Type evolved through print but it is still evolving best usage through new forms of “page” being delivered by the web browser and, more recently, much smaller mobile interfaces. In the Haigh’s examples above we can see that essentially the same spirit is maintained through the use of similar spatial proportions, typefaces and colour schemes. Typography is the art, or skill, of designing communication by means of the printed word.

**Image**

The old saying that “a picture is worth a thousand words” is familiar and generally accepted because pictures have the ability to summarize information through known visual symbolic connections. They are used in web design to present the main content of the web message in condensed quick-reference visual shorthand that offers visual metaphors to help cue general references in the viewer’s memory. Such cuing can generate immediate understanding of information and assist memory retrieval when the viewer wants to search the web for the same kind of information again. Icons work as even more highly condensed graphic images.

In addition to helping people form and recall associations, visual images can enable people to directly process information and thus make fewer errors in understanding (Graber 1990). In her study on how visuals contribute to learning from the news, Graber found that visual images contributed to story comprehension and information gain by adding reality to and clarification of the story, and by providing emotional support. Basil (1994) suggests that although people process audio and written words in common ways, we probably process pictures differently. Basil claims that pictures require fewer mental
resources to process and that picture processing is more automatic; images are perhaps the most emotional and instantaneous of the design elements. These studies on the effects of visual images in traditional media support the claim that visual images give strength to messages. It seems reasonable to apply these findings to web design.

In the area of graphic design, images include icons, statistical diagrams, maps or pictures such as photographs or drawings. Designers may even treat typography, such as calligraphy, as visual elements. With regard to the Haigh’s examples above, images convey a sense of history (through the use of antique photographs and sepia color scheme) and provide continuity across the different media forms.

**Color**

Color has played an important role in different cultures throughout history. The choice of color is vital to design, advertising and marketing. There are national and cultural readings of color: some researchers suggest that certain colors have symbolic connotations in different countries, for example that green is preferred color in Islamic counties, red is the preferred color in China and black is preferred in US, although it has some unfavorable connotations in Asia, Latin America and Europe. Psychological interpretations of colours are also possible, connecting colors with feelings, particularly in advertising. Recent research by Chattopadhyay et al. (2002) suggests that most aspects of color (hue) are likely to be culturally universal. In fact, they found that blue was the most preferred hue in every culture. The choice of colors, to a certain degree, reflects local users’ affective response to a particular color or color combinations.

Considered as physical phenomena, colors are light spectra that people observe through the eyes. From the technological aspect of printing, colors are lines or blocks created by the combination of dots from ink such as cyan, magenta, yellow, black or other specific colors. Colors on the Web are different from colors in print in the sense that they are created and composed differently. According to Cohen (2003), colors in print are created by adding varying quantities of the four process colors (cyan, magenta, yellow, and black) to white paper. However, a light-based medium like a computer screen creates different colors by using red, green, and blue. Some colors, like metallic colors, appear dull on screen and do not translate well from print to the web. Online, vibrant colors such as fluorescent pink or electric blue work well, however they cannot be produced on paper.
using the standard process colors. They can only be replicated by using the Pantone system. “Design for your primary medium, but be aware that some things will not translate” (Jim Frew in Cohen 2003, p. 149). Through vision, color subtly influences human psychology. Many scholars or artists have expressed their views on color through different perspectives and methods. Web pages are no exception. In the Haigh’s examples colour is used with a restricted palette to impart a sense of history and tradition, as well as to maintain continuity across the different mediums.

Materials
As the most common printing material, paper can appear in different forms such as labels, brochures, books and posters. Different papers have different textures and weights, and different smoothness and glossiness gradients. However, paper is no longer the only medium for printing. We can also see prints on non-paper materials such as plastic, metal or even other new materials appearing on cars or glass curtains in buildings. In relation to web pages, the monitor screen is the only material. It has a more versatile and flexible display than traditional media.

Visual elements, such as space, typography, image, color and materials appear simultaneously in a single design and have an integrated visual interactive function. For example, the colors of characters must be in contrast to facilitate readability. The space between lines also seriously affects readability, particularly in Chinese. Many books discuss fundamental design principles, and this study adopts a cross-media viewpoint to compare the difference of visual elements used in print and on websites.

In stark contrast to print media, electronic media have developed rapidly due to the growth of the Internet. Electronic media now produce direct interactions with users through the use of sound and images displayed on computer monitors, as well as through clicking and hyperlinks. The high cost and difficulty of modifying content associated with print media highlight the convenience of the Internet. However, the widespread use of the Internet has only occurred in the past 10 years. Developing web interface designs that are consistent with consumer usage is a vital issue that must be continually addressed.
2.7.3 Cross media

Identity maintenance is always a major goal of communication design. Increasingly, identity maintenance must be conducted across different media platforms, with the information of the same company displayed in different forms such as print and websites. I have collected the following three designs represented by print catalogues and websites, for analysis in terms of four criteria: space, typography, image and color.

Example 1:

Figure 4.1: Production introduction of HAIGH’s Chocolate. PA10 size. Single page. Folded at the center

Figure 4.2: History of HAIGH’s Chocolate. 6 pages of inner page. B5 size. Saddle stapled. Folded at the center


Features of visual presentation:

Space: A simple modern grid has been adopted in each case using design elements of a similar weight and colour scheme. Most important is the proportion of white space to other design elements, which has been maintained at a similar level across all media.

Typography: Traditional serif fonts have been chosen throughout. Although the specific fonts differ, they all evoke the same tasteful and conservative aura. Texts are arranged in columns on a mechanical grid aligned to the left which is modern in style and allows more white space to show through. Wide introductory paragraphs in a larger point-size are used to announce new
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starts in the text, attract attention and provide blocks of texture to the modular layouts.

Image: Sepia color photography provides a sense of continuity across media forms through its controlled color scheme while also evoking history by connoting the period of historical photography when the sepia toning was dominant. Brown also connotes the subject of chocolate.

Color: All examples exploit a clean and modern white background. With dark brown/sepia tone to both text and images, the overall visual impression is tasteful, controlled and evokes history.

The overall visual presentation is deep instead of decorative which shows that this company is confident about the quality of its products. Both the catalogues and the websites provide a unified visual style.

Regarding the display of information, web page electronic media and print media are the most different in terms of page display. Print media allows users to browse content through linear reading. This method of information reception has been the standard for thousands of years, since the invention of writing tools. However, web pages have altered human reading habits in an extremely short time through the use of hyperlinks, which allow users to link to related or unrelated website content instantly. Therefore, assisting the user in understanding his/her current location or providing other browsing tools that facilitate cognition is necessary to prevent the user from becoming lost among a multitude of web pages. This problem must be addressed immediately for emerging media. The visual preferences of users and cognition-related problems that concern this study are crucial to clarifying this issue.
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Example 2:

Figure 5.1: The Arts Center Melbourne brochure 2006. Cover plus 10 inner pages. Folded and saddle stapled in the center.

Figure 5.2: Website of Arts Center Melbourne 2006, http://www.theartscentre.net.au/downloaded on 15/07/2006

Features of visual presentation:

Space: The left sides of the pages are reserved for pictures while the right side is divided by a single column. Overall there is a generous amount of white space creating a very clean and modern presentation.

Typography: Striking san-serif title, with a bold introductory paragraph and left-aligned text. All typography is either pink or black, in a bright but controlled color scheme. A very low density of type on each page creates an accessible and welcoming appearance.

Image: Sweet candy designs present vivid colors. These candies are very bright, large and dominant, presenting an attractive, playful and modern theme. Each is centered on the left of the page. With sufficient space, a refreshing sensation is created with delicate and vivid pictures.

Color: With the colorful title on the cover, the brochure is vivid and elegant. The interior pages adopt a white background without excessive decoration. As the catalogue of the Arts Center Melbourne uses white coated art paper, the colors are more saturated and bright. The overall visual presentation conveys cheerfulness.
These unique and colorful candies appear in both the brochure and website, serving as a reference for categorization. The bright pink of the banner maintains the overall visual sensation of vivid color to make an impression on readers.

“Typography is the art, or skill, of designing communication by means of the printed word” (McLean 1980, p. 1). This definition illustrates the understanding of typography and print media prevalent in the 1980s. In the decade or so that followed, typography became a vital visual element of electronic media due to the proliferation of the Internet. In the example provided, the typography is a particularly eye-catching element of the visual identity of the home page of this website. The page is divided into three columns, similar to the layout used in print media. The first column on the left is relatively narrow and is used as a location for guidance headers. Images and sub-headers, as well as interactive selectable items, are placed in the central column; and explanatory content is provided in the right column. This overall visual design facilitates easy reading. The use of columns in the layout design of websites suggests that this emerging media still relies on the visual preferences accumulated through lengthy experience to gain user approval.
Example 3:

Figure 6.1: The Riedel wine glass brochure

Figure 6.2: The Riedel wine glass website

Figure 6.1 Product catalogue of Riedel wine glass. Rectangular horizontal pages with saddle staples and specification of 1/2 of A4 size. 10 inner pages.

Figure 6.2 Website of Ridel wine glass,

Features of visual presentation:

Space: With a flexible design, there are no identical formats for pictures and texts. Without standardized columns, the designer fully utilizes the overall treatment of pictures with left/right page spread. In the horizontal design, rich images and texts are arranged while blank spaces of similar style on each page avoid crowding.

In the visual representation, the designer keeps the feature of horizontal layout to give a sense of unity in the two different media. Additionally, the horizontal layout will leave a deep impression on the readers.

Typography: Texts are aligned to the left and the pictures and texts are arranged flexibly. Texts are arranged like captions. The representation is lively, stable and of high quality.

Image: Delicate pictures adopting a dark tone are treated with partial gloss. The contrast with the matte black background creates a sense of elegance and quality.

Color: Different from the previous two examples, the Riedel wine glass adopts black backgrounds with dark and detailed pictures to convey the sense of high quality, professionalism and an atmosphere of mystery. Texts are
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simple without excessive decoration, except for white and red for some titles.

From the above three examples, we can conclude that through the arrangement of each visual element, printed catalogues/brochures and websites can create similar visual presentations to achieve the goal of visual identification. However, we also find that websites for the same topic or category, such as for advertising chocolates, present extremely different visual presentations. Although we have observed that particular brands create a consistent identity across different media platforms, we can also observe that a wide range of styles of presentation are appropriate for different products and markets.
Chapter 3 Visual Modality

In the previous chapter the creation of visual identity in commercial sites and campaigns was discussed. This chapter will address the fact that audiences, demographics and customer groups are not uniform in their taste, representing highly differentiated aesthetics. We start by reviewing visual elements in website design. Several examples will be compared and analyzed, and visual presentation discussed in detail. Different styles of web page will be developed.

3.1 Visual modality and presentation for website

The invention of the Internet has broken the boundaries of the separate program outcomes and operational modes of PCs. Obtaining information through the browser has become a feature of modern life. In order to simplify this discussion, web pages related to chocolate are the focus, in order to demonstrate the typical range of options open to the web designer and so lead to a comparison for analysis.
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Figure 7: Chocolate in Wikipedia
http://en.wikipedia.org/wiki/Chocolate
downloaded on 10/11/2006

Figure 8: Chocolate.com
http://www.chocolate.com/
downloaded on 19/10/2006

Figure 9: Haigh’s Chocolates
downloaded on 11/03/2007

Figure 10: M&M'S Chocolates
http://us.mms.com/us/
downloaded on 10/11/2006

Figure 7 is a page introducing chocolate in Wikipedia. Established in 2001, after the Internet became widespread, Wikipedia is a web encyclopedia that allows public editing. A text-based webpage presentation is a feature of the layout of Wikipedia. Users, if inspired, can add to or amend the content. The layout is primarily text-function-oriented, with simple color and little or no decoration, as were print encyclopedias. Such visual presentation complies with the intention behind this website: to create a forum for scientific and objective points of view, without excessive emotional expression, and to
provide a space for the public to create a text-based web encyclopedia. The term “chocolate” is one of nearly two million entries in Wikipedia. To gain universal recognition from different levels of web users, Wikipedia adopts a simple visual presentation with text function the main consideration.

Figure 8 is the website of an international chocolate distributor. The homepage relies on affective appeal as its principal characteristic. The use of color plays an important role. The dark brown background is the color of dark chocolate and this dark, mysterious and affective use of color combines with a sexy female image to create an irresistible seduction. The homepage creates an attractive first impression for viewers. Additionally, it provides information related to chocolate such as the origin and production process. Pictures are used to introduce and connect to different distributors and to provide product information for online shoppers across the globe.

Figure 9 is the Haigh’s Chocolate Company, already mentioned in the previous chapter. The website uses calm, traditional, sepia colors, serif typography and layout in an elegant style. Most of the content of the pages in this website is textual. The 4-column layout has been adopted to solve this problem. The overall layout provides generous reading space, with some pictures treated with masks to imply tradition and quality, and arranged in the text to break the limitation of regimented columns. Such a layout is generally conservative yet with a sense of liveliness from the dispersion of images throughout the text. These visuals together project a company identity that emphasizes quality and product innovation. This type of presentation targets customer groups with mature consumer behavior who demand quality products.

Figure 10 is another well-known chocolate brand, M&M’s. Also a chocolate company, M&M’s visual presentation addresses a completely different mass market. The vivid use of color corresponds to the colorful sugar coating of M&M’s. The color of the text is bright and varied, as are the colors of the chocolates. The font style is also more playful and consistent with the whole web page. The yellow and pink makes people’s hearts beat more quickly. The cute M&M’s puppet and interesting games provide a happy atmosphere that satisfies the needs of happy shopping for young consumer groups.
These four examples are not unique cases. There has been a long history of products in the same field relying on extremely different visual presentations even prior to the Internet. Cleveland (2004) has collected various different views on the definitions of presentation styles from different scholars and writers in his thesis *The Effect of Technology on the Development of Magazine Visual design Style*. When developing his literature review for the definitions of presentation styles in magazine covers, much of Cleveland’s discussion follows the opinions of the creator or artist on the presentation style of the work, such as Ackerman et al (1962) and Kubler (1987). Cleveland takes the perspective of technology to investigate visual presentation. Unlike Cleveland, this study aims to investigate the core problem of website visual presentation, asking the question: should visual designers understand the needs of users before developing their visual presentation style?

The issue of presentation style is similar to Hebdige, who describes design as a form of: “… meaning-construction rather than the final product. The notion of artwork is a kind of practice to reflect reality, as a particular transformation of reality, a version of reality, an account of reality.” (1988, p. 118) This point of view reinforces the close relationship between the means of representation and the object represented, between what in traditional aesthetics have been called respectively the “form” and “content” of artwork. Hebdige believes that meaning has to be constructed through user recognition. Miller (1991) also believes that visual presentation is constructed within the shared cultural pattern of a specific class or background. This pattern is a visual presentation system with a specific meaning to users. The visual experience of any user group is culturally formed, having been influenced by a specific visual culture before encountering the particular visual presentation created by the designer. If the visual designer neglects this basis of user recognition, his work would merely satisfy a personal desire to present ideas. This has the potential to disturb the transfer of information and create more visual noise. In order to investigate preferences and expectations, designers can reach users through feedback forums, surveys or observation. Good web presentations should try to avoid generating any negative affect for users, enabling them to concentrate upon their chosen topic.

This study investigates users’ perspectives on visual presentations. For visual designers, numerous viewpoints on style have provided many text-oriented concepts. Chen & Owen
(1997) think that in the field of linguistics, definitions of style focus on the unique combination, frequency and distribution of certain linguistic elements, including expressive and evocative. According to Schmitt & Simonson (1997), the design of a webpage must be based on the preferences of customers, allowing also for the principle that novelty emerges from difference. If users can experience aesthetic pleasure when reading a web page, they are more likely to return.

Such theoretical statements are fine in intention and make good sense but are insufficient in the world of Internet development. If web visual presentation is the key to building a high quality user experience we must investigate users’ experiences of and preferences for different types of presentations. One way to do this is to categorize specific types of visual presentation by sampling preferences. Sample types could then be tested to examine patterns of visual preference.

In their important paper on visual aesthetic presentation, Tractinsky et al. (2004) maintain that aesthetics play a major role in our private, social and business lives. They argue that aesthetics is relevant to information technology research and practice for three principal reasons. (1) For many users, other aspects of interaction hardly matter anymore. (2) Our evaluations of the environment are primarily visual, and the environment becomes increasingly replete with information technology. (3) Aesthetics satisfies basic human needs, and human needs are increasingly being anticipated by information technology. Toms (2001) believes that the effective use of digital documents depends on a person's ability to recognize the structure and purpose of a document – its class or genre. Understanding digital genres is a quick way of negotiating the chaotic, “anything goes” world of the web document presentation. The issue then is how to categorize different types of website visual presentation.

The development of the Internet is still in the early stages in comparison with the printing industry. If people do in fact define new information technologies such as computers and the Internet through their past experience, then discussion of visual experience in related areas is required before new theories and prototypes for web visual presentation can be established.
Beauty, fun, and pleasure all work together to produce enjoyment - a state of positive affect. There are several ways to generate positive user affect based on preference. The visual appearance of a website can be particularly positive and enjoyable when it relates to taste preferences already established in users’ lives in relation to other media and consumables.

Despite websites and print having different forms of delivery, both visual presentation types refer to the treatment of the same visual elements. In *Reading Images: the grammar of visual design*, Kress and van Leeuwen (1996) adopt the linguistic term “grammar” to analyze visual presentation, however they admit that in the realm of the visual there are no universal rules that govern order. They believe that the grammar of verbal language cannot simply be transposed to interpret visual communication and interaction. To give some order to the field, Kress and van Leeuwen adopt four coding orientations developed by Bernstein (1981) in relation to commercial media, based around four reality principles. Kress and van Leeuwen describe coding orientations as “…sets of abstract principles which inform the way in which texts are coded by specific social groups, or within specific institutional contexts.” (1996, p. 170) They divide visual presentation into four commonly used and encountered categories: 1. Technological - coding orientations, 2. Sensory - coding orientations, 3. Abstract - coding orientations, and 4. Commonsense-naturalistic - coding orientations. Cleveland, in “How much visual power can a magazine take?” (2005) adopts the Bernstein / Kress and van Leeuwen coding orientations to categorize four magazine cover types, as shown in Figure 11 below.

![Figure 11: from left to right: Scientific/Technological-coding orientations, Sensory-coding orientations, Abstract-coding orientations, and Commonsense-naturalistic-coding orientations.](image-url)
Cleveland summarizes the four types of visual presentation by Bernstein/Kress and Leeuwen as follows:

**Scientific/technological-coding orientations:**
The representation of a diagram in which colour represents low modality.

**Sensory-coding orientations:**
Hedonistic pleasure is used as a dominant feature while colours are used to heighten modality for its psychological function.

**Abstract-coding orientations:**
The production and reading of text and images is determined by a code marked by social distinction or a member of the social group or class.

**Naturalistic-coding orientations:**
The dominant code used by society, this is the code most of the members may use regardless of education or social status.

Kress and van Leeuwen developed these coding orientations in relation to print but the categories apply equally to web design, as both media are highly visualized and address markets across the entire social spectrum. I am proposing to test these four types in relation to web design.

This study adopts the coding orientations adopted by Kress and van Leeuwen and Cleveland but transfers the coding to website visual presentation to serve as a reference for the design of the study’s prototype. This study explores the visual power of different website visual presentations in an attempt to understand users’ visual preferences. We would expect user groups that differ by age, culture, educational experience or gender to have different affective responses, so this study seeks to identify the optimal visual presentation type of particular user groups. Visual power in this study refers to the level of feeling aroused by any type of visual presentation. Understanding of the relation between visual power and website visual presentation should help us to determine the appropriate basic style for website visual presentation for a user group, serving as a referent for website designers.
3.2 Establishing coding orientations for instructional websites

This study first adopts the four coding orientations adopted by Kress, van Leeuwen and Cleveland as a way of dividing and summarizing the market of commercial design. To adapt these codes to field of educational information of this study it was necessary to first find web based equivalents to the print based examples given in Cleveland’s study. In this first stage, text-based websites were collected on the Internet that contained representative features of each type. The preliminary search of instructional websites showed that the contents of such websites rely mainly on text with supplementary pictures for communication. Thus, text-oriented websites were analyzed first. Relevant instructional websites were compared to classify the features of each visual presentation, which would act as the representative type after review. This classification serves as a convenient indicator of styles of presentation only. The research undertaken was expressly to test for differences in responses to visual presentation, and not to validate Kress and van Leeuwen’s (1996) typology.

Sourcing a text and subject

This study focuses on the visual presentation of online instructional websites. In order to control the operating variables of the content, sample text contents of a variety of instructional websites were collected. It was decided that a ubiquitous subject was needed that would not be seen as discipline specific by any of our user groups. Thus the major instructional website reference chosen was the University of Alberta, Canada, with the subject matter, Powerpoint.

Figure 12: PowerPoint instruction website of University of Alberta, Canada
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The text content of the four PowerPoint instructional websites tested is the same. Non-visual factors such as sound, animation and video were excluded in order to avoid differences due to non-visual factors.

**Site A: Technological-coding orientations**

![ScreenBeans, http://www.bitbetter.com/powertips.htm, downloaded on 19/10/2006.](image)

This website belongs to an online clipart company. The page layout on this website relies mainly on text with a few cartoon characters. The instructions and tips for PowerPoint are included on the company website. Although this site mainly sells clipart, text-oriented visual presentation is the main feature of this website, Thus it was selected as the sample of Site A.

![Site A - Technological coding orientations. Above are the three sites used as illustrations in this thesis to represent this category – note their general similarity in layout and design elements. The feature of the visual presentation is mainly text. There are no images in this webpage.](image)
Site B: Sensory-coding orientations

As described in the beginning of this chapter, Site B is the website of an international chocolate distributor. The homepage adopts an affective appeal and provides information about chocolate such as the production process and the analysis of the relationship between chocolate and humans. Therefore, this website was chosen to represent the visual presentation of this type.

Figure 15: Chocolate.com, http://www.chocolate.com/, downloaded on 20/10/2006.

Figure 16: Site B - Sensory coding orientations. Above are the sites used as illustrations in this thesis to represent this category – note their general similarity in layout and design elements. Dark backgrounds and close-up treatment of the eyes are used to create an affective appeal in their visual presentation in order to grasp users’ focal attention.
Site C: Abstract coding orientations


Every Microsoft user is familiar with this web visual presentation so it is essential to include this. After examining its visual presentation type, this website was categorized as Site C.

Figure 18: SiteC - Abstract coding orientations. Above are the three sites used as illustrations in this thesis to represent this category – note their general similarity in layout and design elements. Based on the Microsoft webpage, this study attempts to understand if users agree with this type of visual presentation when they are familiar with the operational interface.
Site D: The commonsense-naturalistic-coding orientation

Actden is a website of ACT360° Media Ltd which is an educational software development company. Using cartoon characters and a stage curtain as the background, this website uses fresh and lively color to refresh the viewers. The tone of the visual presentation complies with Site D.


Figure 20: SiteD - The commonsense naturalistic coding orientations. Above are the three sites used as illustrations in this thesis to represent this category – note their general similarity in layout and design elements. This website features lively designs and vivid colors, appealing to users’ visual preference types through decorative picture treatment.
Chapter 4 Research Methodology

4.1 Subjects

A total of 425 subjects participated in the study, 214 from Australia and 211 from Taiwan. Their distribution in terms of gender, profession, and level of education is given in Table 1. Matched university students from both countries were selected. Aside from convenience, this minimized demographic differences between the countries.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>214</td>
<td>50.4</td>
</tr>
<tr>
<td>Taiwan</td>
<td>211</td>
<td>49.6</td>
</tr>
<tr>
<td><strong>Training Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>224</td>
<td>52.7</td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>201</td>
<td>47.3</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Year</td>
<td>200</td>
<td>47.1</td>
</tr>
<tr>
<td>Final Year</td>
<td>225</td>
<td>52.9</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Female</td>
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<td>49.6</td>
</tr>
<tr>
<td>Male</td>
<td>214</td>
<td>50.4</td>
</tr>
</tbody>
</table>

4.2 Stimuli

Four web sites were designed based upon Kress and van Leeuwen’s (1996) four types of visual presentation:

1. Scientific/technological coding.
2. Sensory coding.
3. Abstract coding.

As already mentioned, this classification served as a convenient indicator of styles of presentation only. The research undertaken was to test for differences in responses to
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visual presentation, and not to validate Kress and van Leeuwen’s (1996) typology. The four stimuli are given in Figure 21.

Site A – Scientific/Technological coding

Site B - Sensory coding

Site C - Abstract coding

Site D - Naturalistic coding

Figure 21: The four types of web site
4.3 Questionnaire and Procedure

The questionnaire consisted of 15 scales designed to measure aesthetic-emotional responses to the four web sites. These scales were largely derived from a previous study (Haig & Whitfield 2001).

The design of this site is appropriate for online teaching material.
The site is visually harmonious.
The site is visually interesting.
The site is visually elegant.
I would like to use this site.
This site is visually modern.
This site is novel in its visual design.
This site is visually attractive.
This site has great visual impact.
This is a colourful site.
This site is fun, visually speaking.
This site is visually dynamic.
This site is closest to my preferred style.
The design of this site looks European.
This site looks feminine.

The scales involved rating each question on a 10-point disagree to agree measure. This uniformity has a number of statistical advantages, including permitting multidimensional scaling to be performed upon the data. Taiwanese subjects received a Chinese language version of the questionnaire while Australian subjects received an English language version.
Chapter 5 Discussion and findings

5.1 Results of the Experiment

The following research questions were addressed in this study.

Q1: Are the four sites differentiated?
Q2: Are there differences between countries?
Q3: Are there differences between profession?
Q4: Are there differences between grades?
Q5: Are there gender differences?

Q1: Are the four sites differentiated?

In order to test for differences a Multivariate Analysis of Variance (MANOVA) was performed. The results indicate that the four sites were clearly differentiated (F=43.8, d.f. 48, p< 0.001). Furthermore the sites were clearly differentiated for all questions (1 to 15) at p< 0.001.

Table 2: Multivariate tests

<table>
<thead>
<tr>
<th>Effect</th>
<th>Factor</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Subjects</td>
<td>SITE</td>
<td>43.84</td>
<td>.00</td>
</tr>
</tbody>
</table>
The tests of between-subjects effects in Table 3 present the significance for each question.

Table 3: Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Measure</th>
<th>Type III Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2</td>
<td>65261.23</td>
<td>65261.23</td>
<td>6001.01</td>
<td>.00</td>
</tr>
<tr>
<td>Q3</td>
<td>58941.24</td>
<td>58941.24</td>
<td>5142.45</td>
<td>.00</td>
</tr>
<tr>
<td>Q4</td>
<td>44074.32</td>
<td>44074.32</td>
<td>3913.05</td>
<td>.00</td>
</tr>
<tr>
<td>Q5</td>
<td>38280.29</td>
<td>38280.29</td>
<td>3353.85</td>
<td>.00</td>
</tr>
<tr>
<td>Q6</td>
<td>45026.47</td>
<td>45026.47</td>
<td>3705.39</td>
<td>.00</td>
</tr>
<tr>
<td>Q7</td>
<td>31355.65</td>
<td>31355.65</td>
<td>3044.65</td>
<td>.00</td>
</tr>
<tr>
<td>Q8</td>
<td>44043.77</td>
<td>44043.77</td>
<td>3743.54</td>
<td>.00</td>
</tr>
<tr>
<td>Q9</td>
<td>39072.06</td>
<td>39072.06</td>
<td>3362.78</td>
<td>.00</td>
</tr>
<tr>
<td>Q10</td>
<td>38346.75</td>
<td>38346.75</td>
<td>3368.52</td>
<td>.00</td>
</tr>
<tr>
<td>Q11</td>
<td>37929.94</td>
<td>37929.94</td>
<td>3531.42</td>
<td>.00</td>
</tr>
<tr>
<td>Q12</td>
<td>36544.66</td>
<td>36544.66</td>
<td>3965.09</td>
<td>.00</td>
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<tr>
<td>Q13</td>
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<td>34695.53</td>
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<tr>
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<td>2744.83</td>
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<td>2075.04</td>
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<tr>
<td>Q17</td>
<td>23719.12</td>
<td>23719.12</td>
<td>2306.70</td>
<td>.00</td>
</tr>
</tbody>
</table>

Figure 22: Graph of the means from question 2 to question 5 of each site.
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Figure 23: Graph of the means from question 6 to question 9 of each site.

Figure 24: Graph of the means from question 10 to question 13 of each site.

Figure 25: Graph of the means from question 14 to question 17 of each site.
5.2 Dimension reduction

Factor Analysis was applied to look for commonalities amongst the sixteen questions and thereby to identify possible underlying dimensions.

Orthogonal rotation was applied to obtain the rotated factor loading matrix.

The mean score and SD of each item are tabulated below in Table 4:

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>Std Deviation (SD)</th>
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</thead>
<tbody>
<tr>
<td>Q2</td>
<td>6.20</td>
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</tr>
<tr>
<td>Q3</td>
<td>5.89</td>
<td>2.81</td>
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<tr>
<td>Q4</td>
<td>5.09</td>
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<tr>
<td>Q5</td>
<td>4.75</td>
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<td>Q6</td>
<td>5.15</td>
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<tr>
<td>Q7</td>
<td>4.30</td>
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<tr>
<td>Q8</td>
<td>5.09</td>
<td>3.03</td>
</tr>
<tr>
<td>Q9</td>
<td>4.79</td>
<td>2.98</td>
</tr>
<tr>
<td>Q10</td>
<td>4.75</td>
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<tr>
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<td>Q15</td>
<td>4.38</td>
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<tr>
<td>Q16</td>
<td>4.33</td>
<td>2.98</td>
</tr>
<tr>
<td>Q17</td>
<td>3.74</td>
<td>2.90</td>
</tr>
</tbody>
</table>
Three factors were obtained in the factor analysis and only Q7 was included in Factor 3. As a stable factor must include at least 3 questions (Ciou 2006), Q7 was eliminated, and the factor analysis continued with the remaining 15 items. Results are shown in Table 5 below.

Table 5: KMO and Bartlett's test

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</th>
<th>.96</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bartlett's Test of Sphericity</strong></td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>23918.32</td>
</tr>
<tr>
<td>df</td>
<td>105</td>
</tr>
<tr>
<td>Sig.</td>
<td>.00</td>
</tr>
</tbody>
</table>

Here the Kaiser-Meyer-Olkin (KMO) is the ratio of the coefficient and its partial coefficient of a variable. And the maximum of KMO is 1. The greater the KMO value, the more the common factors of variances, and it will be more suitable for analysis. According to Kaiser (1974), if KMO<0.5 it is not suitable for Factor Analysis. As the KMO in this study is 0.961, it is suitable for Factor Analysis. Furthermore, the result of Bartlett’s Test of Sphericity is 23918.318 (df 105), which is statistically significant. This means that there are common factors in the correlation matrix, and it is suitable for Factor Analysis.

According to Zalteman & Burger (Zalteman 1975), the factor extraction is acceptable when the eigenvalue is greater than 1, the loading of variances is greater than 0.3, and the cumulative variance explained is over 40%. Overall & Klett (Overall 1972) claim that if it constituted three or more variances in a factor, and the absolute loading is greater than 0.35, this factor is fairly stable. According to Joseph, Rolph & Ronald (Joseph 1987), a factor is considered significant if the absolute loading is greater than 0.3, important if the absolute loading is greater than 0.4, and very significant if the absolute loading is greater than 0.5. Applying Principle Component Analysis (PCA) and orthogonal rotation, the post-rotation factor loading must be greater than 0.3. Strict criteria were selected for this study. Variances with absolute factor loadings greater than 0.5 were selected as a reference for factor naming. After the rotation analysis, the absolute factor loadings of all 15 variances were greater than 0.5.
Two factors each with eigenvalues greater than 1, absolute factor loadings greater than 0.5, and cumulative variances that explained of 71.83% were selected. These two factors explain 71.83% of the total variation of 15 variables. As shown in the scree plot, the curve is quite flat after Factor 3, suggesting that it is appropriate to select two factors.

Table 6: Total variance explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>1</td>
<td>9.44</td>
<td>62.95</td>
</tr>
<tr>
<td>2</td>
<td>1.33</td>
<td>8.89</td>
</tr>
</tbody>
</table>
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Figure 26: Graph of Scree Test

Table 7: Rotated Component Matrix (a)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Component</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q12: Colourful</td>
<td></td>
<td>.87</td>
<td>.21</td>
</tr>
<tr>
<td>Q13: Fun, visually speaking</td>
<td></td>
<td>.85</td>
<td>.33</td>
</tr>
<tr>
<td>Q14: Dynamic</td>
<td></td>
<td>.82</td>
<td>.37</td>
</tr>
<tr>
<td>Q11: Impact</td>
<td></td>
<td>.80</td>
<td>.44</td>
</tr>
<tr>
<td>Q10: Attractive</td>
<td></td>
<td>.75</td>
<td>.53</td>
</tr>
<tr>
<td>Q09: Novel</td>
<td></td>
<td>.69</td>
<td>.49</td>
</tr>
<tr>
<td>Q17: Feminine</td>
<td></td>
<td>.67</td>
<td>---</td>
</tr>
<tr>
<td>Q16: European</td>
<td></td>
<td>.50</td>
<td>.44</td>
</tr>
<tr>
<td>Q02: Appropriate</td>
<td></td>
<td>---</td>
<td>.83</td>
</tr>
<tr>
<td>Q03: Harmonious</td>
<td></td>
<td>.18</td>
<td>.81</td>
</tr>
<tr>
<td>Q05: Elegant</td>
<td></td>
<td>.39</td>
<td>.76</td>
</tr>
<tr>
<td>Q06: Like to Use</td>
<td></td>
<td>.45</td>
<td>.75</td>
</tr>
<tr>
<td>Q15: Preferred</td>
<td></td>
<td>.53</td>
<td>.65</td>
</tr>
<tr>
<td>Q08: Modern</td>
<td></td>
<td>.53</td>
<td>.65</td>
</tr>
<tr>
<td>Q04: Interesting</td>
<td></td>
<td>.63</td>
<td>.64</td>
</tr>
</tbody>
</table>
The major benefit of conducting factor analysis is to reduce the complexity among questions. In support of this, Multidimensional Scaling analysis (MDS) was performed to measure the relationship among these questions within each factor and to conceive of a meaningful name to assist further analysis. The MDS charts analysis shown below are for factor one and factor two.

**Factor One**

![Figure 27: Multidimensional scaling analysis of factor one](image-url)

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Factor Two

Euclidean distance model

Figure 28: Multidimensional scaling analysis of factor two

5.3 Discussions

This found that the original 15 questions – or scales – could be collapsed into two underlying dimensions; what we have termed *Dynamic Impact* and *Aesthetic Appeal*. Together they accounted for 71.8 per cent of the total variance.

In *Factor One*, there are 8 questions with an absolute factor loading greater than 0.5. *Dynamic Impact* has high Factor loadings on colourful, fun to use, dynamic, and impact. These can reasonably be interpreted as arousal-based variables, and what Berlyne (1971) would term *collative variables*. In other words, they measure the visual impact or the arousal level of the web sites.

In Figure 27, Factor one, the core of the answers shows that they are linked to fun, and visual aspects such as: visually dynamic, visual impact and visual attractiveness. The meanings of these vocabularies with the visual presentation of the 4 coding categories/websites are concluded. They pertain to a motivation for arousing user’s attention. These can reasonably be interpreted as arousal-based variables, and what Berlyne (1971) would term *collative variables*. In other words, they can measure the
visual impact or the arousal level of the web sites. To conclude the names from the core, we name it the motivation of "Dynamic Impact".

In Factor 2, there are 7 questions with an absolute factor loading greater than 0.5. In Figure 28, Factor two has high factor loadings on visually elegant, interesting, would like to use it. Aesthetic Appeal has high Factor loadings on appropriateness, harmoniousness, and elegance. The former, appropriateness, is a categorical variable highly influential in the prediction of aesthetic preference (Whitfield & Slatter, 1979; Whitfield, 1983; Martindale, 1988), while the others align with this “aesthetic” interpretation. With respect to the diversity of users’ preferences/favorites style towards the four web sites, it is thus named “Aesthetic Appeal”.

The factor loading of the naming, eigenvalue, variance explained, cumulative variance explained and measuring variances of the website visual factor dimensions are tabulated in Table 8.

Table 8: Naming, eigenvalue, variance explained, cumulative variance explained of website visual factor dimensions

<table>
<thead>
<tr>
<th>Factor</th>
<th>Naming</th>
<th>Eigenvalue</th>
<th>Variance explained%</th>
<th>Cumulative variance explained %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor One</td>
<td>Dynamic Impact</td>
<td>5.85</td>
<td>39.01</td>
<td>39.01</td>
</tr>
<tr>
<td>Factor Two</td>
<td>Aesthetic Appeal</td>
<td>4.93</td>
<td>32.83</td>
<td>71.84</td>
</tr>
</tbody>
</table>

Table 9: List of questions for the two factors.

<table>
<thead>
<tr>
<th>Aesthetic Appeal</th>
<th>Dynamic Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2: The design of this site is <em>appropriate</em> for online teaching material.</td>
<td>Q9: This site is <em>novel</em> in its visual design.</td>
</tr>
<tr>
<td>Q3: This site is visually <em>harmonious</em>.</td>
<td>Q10: This site is visually <em>attractive</em>.</td>
</tr>
<tr>
<td>Q4: This site is visually <em>interesting</em>.</td>
<td>Q11: This site has great visual <em>impact</em>.</td>
</tr>
<tr>
<td>Q5: This site is visually <em>elegant</em>.</td>
<td>Q12: This is a <em>colourful</em> site.</td>
</tr>
<tr>
<td>Q6: I would <em>like to use</em> this site.</td>
<td>Q13: This site is <em>fun, visually speaking</em>.</td>
</tr>
<tr>
<td>Q8: This site is visually <em>modern</em>.</td>
<td>Q14: This site is visually <em>dynamic</em>.</td>
</tr>
<tr>
<td>Q15: This site is the closest to my <em>preferred</em> style.</td>
<td>Q16: The design of the site looks <em>European</em>.</td>
</tr>
<tr>
<td>Q17: This site looks <em>feminine</em>.</td>
<td></td>
</tr>
</tbody>
</table>
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The independence of these two dimensions is indicated in Figure 29.

Figure 29: Dynamic Impact and Aesthetic Appeal as independent dimensions
Table 10: Descriptive statistics of website visual factors of variables below standard

<table>
<thead>
<tr>
<th>Factor</th>
<th>N</th>
<th>Dynamic Impact</th>
<th>Aesthetic Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Error of Mean</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>856</td>
<td>-0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>Taiwan</td>
<td>844</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>Total</td>
<td>1700</td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Profession</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication Design</td>
<td>896</td>
<td>-0.19</td>
<td>0.03</td>
</tr>
<tr>
<td>Information Technology</td>
<td>804</td>
<td>0.21</td>
<td>0.04</td>
</tr>
<tr>
<td>Total</td>
<td>1700</td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Year</td>
<td>800</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>Final Year</td>
<td>900</td>
<td>-0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>Total</td>
<td>1700</td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>844</td>
<td>-0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>Male</td>
<td>856</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>Total</td>
<td>1700</td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site A</td>
<td>425</td>
<td>-0.90</td>
<td>0.03</td>
</tr>
<tr>
<td>Site B</td>
<td>425</td>
<td>0.27</td>
<td>0.04</td>
</tr>
<tr>
<td>Site C</td>
<td>425</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Site D</td>
<td>425</td>
<td>0.87</td>
<td>0.04</td>
</tr>
<tr>
<td>Total</td>
<td>1700</td>
<td>0.00</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Q.2 Are there differences between Taiwanese and Australians respondents?  
Q.3 Are there differences between IT and Design respondents?  
Q.4 Are there differences due to level of education?  
Q.5 Are there gender differences?

To test for differences between Taiwanese and Australian respondents the Factor weightings for Dynamic Impact and Aesthetic Appeal became the two dependent variable in a MANOVA analysis, with nationality, profession, education level, and gender as the grouping variables or main effects. The results indicate that there are significant differences due to nationality, profession, and level of education, but surprisingly there
are no differences due to gender. The MANOVA provides an overall analysis, and shows that the main differences are due to nationality (F=64.1, d.f. 2, p< 0.001) and profession (F=62.0, d.f. 2, p< 0.001). While the difference due to level of education is statistically significant, it is small (F=11.2, d.f. 2, p< 0.001), and for this reason it will be discounted in the remainder of the discussion.

If we dissect the differences due to nationality for both Dynamic Impact (Figure 30) and Aesthetic Appeal (Figure 31), it can be seen that there is little difference between the Taiwanese and Australian respondents, except for Site D. The main difference is for Aesthetic Appeal, with the Taiwanese consistently rating all sites higher than the Australians.

Figure 30: Dynamic Impact of the four sites to Taiwanese and Australian subjects
For profession, the Information Technology respondents consistently rate all sites higher for both Dynamic Impact (Figure 32) and Aesthetic Appeal (Figure 33). This effect has been observed previously, whereby IT respondents rated web sites higher than Design respondents on all measures (Haig & Whitfield 2001).

Figure 31: Aesthetic Appeal of the four sites to Taiwanese and Australian subjects
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Figure 32: *Dynamic Impact* of the four sites to Communication Design and Information Technology subjects

Figure 33: *Aesthetic Appeal* of the four sites to Communication Design and Information Technology subjects
5.4 Theoretical and Empirical Implications

The results show clear differences in the evaluation of web sites between (a) Taiwanese and Australian, and (b) IT and Design respondents. If we take nationality first, it is apparent that Dynamic Impact for three of the four sites tested is equivalent for both national groups. In other words, the visual power (Cleveland 2004) or arousal level (Berlyne 1971) of these three web sites is the same for each nationality.

This is consistent with the notion of arousal as a wired-in feature of brain processing (Pfaff 2006) and, by implication, a feature that is culturally invariant. The sensory impact of stimuli would be due less to cultural factors than to the psychophysical properties of the stimuli – in this case the web sites. Dynamic Impact, therefore, may be seen as a neurobiological phenomenon, and one that should be impervious to cultural differences. This should hold true for “normal” stimuli; that is for stimuli that lack powerful emotional salience due to cultural associations. For example, in Europe prior to the 1940s the swastika lacked powerful emotional salience: after 1940 it did not.

The Dynamic Impact results for Sites A, B and C are so well matched that it is worth considering whether the specific imagery of Site D was in fact highly emotionally salient for the Taiwanese subjects, given that they judged it as of higher dynamic impact than the Australians. Although the design and content of the site may appear innocuous, its two most obvious features, the yellow stars and the bright blue curtain may both have political connotations for Taiwanese subjects; the yellow stars reminding of the Chinese flag, and the strong blue colour forming an association with the Pan-Blue Coalition of Taiwan, who have been seen as promoting a Chinese nationalist identity. Of course this is a speculative point, but at least makes clear that it is genuinely possible that aspects of the site were emotionally salient for the Taiwanese students but not for the Australian students. However, this point does not readily explain that the Australian subjects found this site much less appealing than the Taiwanese subjects, whose response to its aesthetic appeal was neutral. At the same time, neutrality may be an indicator of ambivalence, which is plausible given that the site clearly did not have any relation to Taiwanese politics. The reasons that the Australian subjects judged this site as so low on aesthetic appeal probably bear no relation to this response from the Taiwanese subjects.
If the judgement of *Dynamic Impact* is a neurobiological phenomenon, then we can assume that it involves a simpler judgement than *Aesthetic Appeal*. The equal results for both national groups already discussed supports this, as does the further point that the results for *Dynamic Impact* do not map onto those of *Aesthetic Appeal*. This is particularly evident in the results for site C, which showed a small negative level of arousal but was the most preferred by both groups; arousal is not a good predictor of appeal. However, at the extreme ends of the spectrum arousal level is assumed to have a more pronounced effect on overall appeal, a point also reinforced by the results; the sites with the lowest (site A) and highest (site D) *Dynamic Impact* were the least appealing across all groups.

In contrast, we can expect *Aesthetic Appeal* to be subject to cultural influences. The three main theories of aesthetics to emerge from empirical psychology emphasize a mediating stage between “emotion and the outer world” (Silvia 2006). Appraisal Theory emphasizes the individuality of appraisal and its obvious foundation in cultural norms. The Processing Fluency Model posits that ease of processing generates positive emotion; while the Categorical-Motivation Model takes two positions. For familiar stimuli in what it terms “closed categories” (i.e. categories that are well formed and closed to further articulation, such as medieval cathedrals, grand pianos, and Georgian furniture), positive emotion will accord with the Processing Fluency Model. However, and significantly, for “open categories” (i.e. categories that are ill formed and open to further articulation) such as web sites, then positive emotion will favour stimuli that involve effort in their processing. So, “closed categories” will favour typical stimuli, while “open categories” will favour novel stimuli. An important caveat, however, is that “open” and “closed” will be culturally specific, a position consistent with Appraisal Theory. This means, quite simply, that, say, Italian Renaissance paintings and Shaker furniture are “closed categories” to those familiar with them, but “open categories” to those who are not. In the case of web sites we are dealing with a recently formed category: it is hardly formed and closed. Cultural differences would be anticipated, and the results confirm this. Interestingly, the order of *Aesthetic Appeal* is identical for both Taiwanese and Australian respondents: the difference lies in the degree of *Aesthetic Appeal*. This suggests some shared cultural values, as well as some differences.
Interestingly, even though the order of *Aesthetic Appeal* was the same for both groups, the Australian subjects rated only one site (Site C) as having positive aesthetic appeal, whilst the Taiwanese subjects rated two as positive (Sites B & C) and one as neutral (Site D), thus judging only Site A as clearly aesthetically unappealing. The Taiwanese students appeared to be, overall, more positively disposed to the appearance of the sites. One possible explanation for this relates to the educational purpose of the site. It is not altogether surprising that both groups rated Site C the highest for *Aesthetic Appeal*; as an example of the abstract-coding orientation, it can be seen as the most appropriate form for an educational site. Thus it is possible that the Australian students were more concerned with appropriateness to content in their judgments of aesthetic appeal, with the Taiwanese students less concerned with appropriateness and therefore more flexible in their perceptions of how particular kinds of sites should look; even though their clear preference was for site C, they also found site B aesthetically appealing. It may even be the case that the Australian students preferred site C for educational purposes at least partly *because* of its small negative *Dynamic Impact*; lower arousal may be seen as less distraction from content and give the site more credibility. This would make sense in relation to the abstract-coding orientation, as well as the fact that this coding orientation would probably conform to expectations based on prior experience for educational sites.

That the Australian subjects found site D, with the highest arousal, so strongly unappealing does seem to further support this point, although whether it is the level of arousal or the particular stimuli in this design that seemed particularly inappropriate is not clear. In relation to the Categorical-Motivation Model, these points do suggest that both groups judged site C as the most appropriate visual presentation for educational materials, but that for the Taiwanese subjects the category of “educational sites” is more open than for the Australian subjects. This explanation could be extended to offer a hypothesis for the overall higher ratings for *Aesthetic Appeal* by the Taiwanese students, that the category of web sites as a whole, along with sub-categorisations such as “educational sites” is more open. At the same time, language needs to be taken into account; the web sites in this study were in English, a factor that would likely influence the perceptions of appropriateness for the Taiwanese subjects.

However, this interpretation may be a simplification of more complex factors. As the mid-range of the four sites in terms of arousal, sites B and C also received the highest ratings for aesthetic appeal from both groups, yet for the Taiwanese subjects this was a
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positive rating, whereas the Australian subjects rated it negatively. This may be due to the particular stimulus in site B, a photograph of a man’s eyes with the rest of the face not shown. Whilst this stimulus does relate well to the sensory-coding orientation, it may have different connotations for each cultural group. The Australian students may have found the eyes disconcerting in some way, whilst the Taiwanese students evidently either found them appealing or were not disturbed by them and judged the site in terms of other design features. Obviously all of these points in relation to cultural differences are only suggestions, and the underlying complexity of what might initially appear to be a straightforward result, that both cultural groups gave the same order of aesthetic appeal for the four sites, demonstrates the need for further studies in which stimuli are more strictly controlled. It would be interesting to use a different stimulus in the sensory-coding orientation to see whether the cultural difference is for this type of site, or more specifically the response to this particular stimulus.

To consider now the results for the IT and Design participants, they differ for Aesthetic Appeal, as would be anticipated. Furthermore, the difference is as for nationality above. Both groups exhibit a similar order of Aesthetic Appeal: the difference lies in the degree, with the IT respondents rating all sites higher. As stated earlier, this identical effect has been observed for web sites judged by IT and Design respondents by Haig and Whitfield (2001), though using only Australian respondents. The results for Dynamic Impact are more complex. As discussed above, when the data for IT and Design respondents are combined, there is no significant difference between Taiwanese and Australian respondents. However, by segmenting each national group into IT and Design, then differences emerge due to training. A plausible explanation is that the lower ratings given by the Designers reflect their general familiarity with such visual material. Familiarity will lead to greater ease of processing (Processing Fluency Model), which in turn will generate lower arousal. Dynamic Impact therefore will be less.

In conclusion, this study observes differences due to both nationality and profession. If we regard both as cultural factors – and the notion of “culture” would seem to accommodate both – then we encounter complex relationships. Complication increases if we include level of training, because this also becomes a cultural variable. We deliberately have excluded it for reasons of parsimony, though it plays a role, albeit minor. The two underlying dimensions identified, Dynamic Impact and Aesthetic Appeal, are plausible
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and can be accommodated within existing theory. Finally, the Categorical-Motivation Model provides a perspective on aesthetics that ties it in to existing theory and adds a neuroevolutionary underpinning.
6 Conclusion

This study’s focus upon web sites is somewhat incidental. We would expect the affective processes that engage web sites to be common to the evaluation of all stimuli in the external world. We would further expect that these evolved over the millennia from our ancestors’ initial survival in the savannah to our eventual and recent domicile in a modern habitat. We are talking about a timescale of approximately five million years – though our pre-hominid ancestry as mammals would take us back much further. We do not assume that the brain evolved a new appraisal mechanism upon the emergence of web sites: brains do not evolve that quickly. So how do the results of this study inform us of these underlying processes, and from this provide guidance to design practice?

The first pertains to what is commonly referred to as the aesthetic. This is a misnomer derived from Baumgarten that led to the influential notion of a unitary experience of disinterested pleasure, normally resulting from an encounter with art objects. It remains an opaque area, though, as indicated above, emerging theories from empirical psychology begin to unravel this. These theories share a common neuoevolutionary perspective. They also regard the aesthetic as part of a broader affective domain. By adopting this perspective, and one consistent with the above theories, an interpretation can be offered of the above results that should inform design practice. The emergence of two independent dimensions, Aesthetic Appeal and Dynamic Impact, indicates that they underlie the affective appraisal of the web sites. In other words, designers must contend with these dimensions when constructing a site. Furthermore, their existence appears consistent across nationality, gender, and professional group. This reinforces their primacy. Significantly, Dynamic Impact varies little across the various groups, suggesting that it is less subject to individual-cultural differences than Aesthetic Appeal, which is subject to greater individual-cultural differences and therefore requires caution. In practice, designers would need to test the Aesthetic Appeal of their designs with the target group of interest. This is particularly important when the target group is of a different nationality than the designer. If appropriateness is a major factor in perceptions of aesthetic appeal, as the Categorical-Motivation model suggests, then this is likely a key point of difference amongst varying cultures and nationalities. Thus, when designing for an audience different from their own, designers should consider testing. This is unfamiliar territory for designers, but it is familiar within the market research community. Of course testing
always provides information, even if simply confirmation that a design functions as intended. In general, given that all the sites were clearly differentiated in the results, Kress and van Leeuwen’s (1996) typology provides a useful classification that could support further research. Further research into the perceptions of these types, in terms of both dynamic impact and aesthetic appeal, would be worthwhile, particularly to ascertain how much the preference for types is influenced by perceptions of the appropriateness a given type for a specific subject area. Larger as well as more controlled stimulus sets than the set used in this study would be beneficial.

Regarding the appraisals that designers make, a phenomenon that emerges in this study and another also involving web sites (Haig and Whitfield, 2001) is that designers consistently underrate the effect of the site upon non-designers. Effectively, designers judge them less colourful, less complex, etc, than non-designers right across the range of scales used. Given the very uniformity of results from both studies, it suggests that by virtue of their experience of designing (as an expert group) that they underestimate the visual-affective characteristics that the design possesses to non-expert groups. In practice this indicates that the designer can cautiously assume that Dynamic Impact and Aesthetic Appeal will be perceived as higher by non-designers. This may be comforting for designers. It means that when they regard their designs as “average”, their audience will not. They will probably perceive them as more dynamic and appealing than the designer. On the other hand, at times this may have a negative impact on the reception of designs by non-designers, if the level of dynamic impact is not matched to perceptions of appropriateness for a certain type of content. Such an effect did not appear to occur in this study, as the site with the highest dynamic impact, towards the extreme end of the scale where dynamic impact begins to have an adverse effect on appeal, was still rated higher in aesthetic appeal by the non-designers; they found it less unappealing than the designers. Even so, that designers may at times need to reduce the dynamic impact of a site to maintain it within an appropriate range for a particular type of content is conceivable. It is worthwhile for designers to keep this in mind.

Perhaps the most surprising result to emerge from this study is the absence of gender difference. There are statistically significant differences due to nationality and occupational group (designers versus non-designers) but none due to gender. From a
practical design standpoint, this means that the designer can reasonably assume that their design decisions will be gender neutral. Of course, given that this study presented an educational site, it would be worth exploring whether gender is also a constant in relation to the perceptions of designs with different types of content.
Appendix

Questionnaire
The following research investigates the effect that the styling of information has on its reception by its readers in relation to online educational materials. Your participation might contribute to a better understanding of the role of styling in relation to online educational sites and lead to more appealing and appropriate graphic treatments. We are asking you to view four differently styled sites and evaluate each of them through 17 questions on a ten point scale. We estimate that the survey should take between 10 and 15 minutes.

We are not asking for your name and will not be able to identify you through your participation in this study.

Participants should feel free to withdraw from participation in the study by not completing the questionnaire.

By completing this questionnaire you are allowing us to use the data in this study and writing that ensues from it.

Any questions regarding the project An investigation of visual power in online instructional materials can be directed to the Senior Investigator, Dr Keith Robertson, of the Faculty of Design, Swinburne University, 03 9214 6092

COMPLAINT PROCEDURE
The information must clearly set out how the participant can lodge a complaint about the way he/she has been treated during the study, or a query that the Senior Investigator has been unable to satisfy. This should provide contact details to the Head of the School or Research Institute involved and also that complaints can be directed to:

The Chair
Human Research Ethics Committee
Swinburne University of Technology
P O Box 218
HAWTHORN. VIC. 3122
Phone: (03) 9214 5223
Please complete the following details below:

Course and Year

Sex: □ Female □ Male

Instructions
All of the following questions involve a 10 point rating scales. The extremes are located at each end of the scale.

Please tick in the square that best expresses your opinion.
Please tick only one for each question.

Example A

agree disagree
I would like to use this site. □ □ □ □ □ □ □ □ □ □

Example B

agree disagree
I would like to use this site. □ □ □ □ □ □ □ □ □ □

Example A: indicates that you strongly agree to use that site.
Example B: indicates that you strongly disagree to use that site.

Please do not write your name on the questionnaire.

If you have any problems understanding or completing the questionnaire please ask the administrator for help.

Thank you for your help and co-operation.
Please turn to the next page to answer the question.
This site looks like a typical online teaching Web site.

The design of this site is appropriate for online teaching material.

This site is visually harmonious.

This site is visually interesting.

This site is visually elegant.

I would like to use this site.

This site is visually complex.

This site is visually modern.

This site is novel in its visual design.

This site is visually attractive.

This site has great visual impact.

This is a colourful site.

This site is fun, visually speaking.

This site is visually dynamic.

This site is the closest to my preferred style.

The design of the site looks European.

This site looks feminine.
This site looks like a typical online teaching Web site.  

<table>
<thead>
<tr>
<th>agree</th>
<th>disagree</th>
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The design of this site is appropriate for online teaching material.  

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This site is visually harmonious.  

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This site is visually interesting.  

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This site is visually elegant.  

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I would like to use this site.  

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This site is visually complex.  

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This site is visually modern.  

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This site is novel in its visual design.  

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This site is visually attractive.  

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This site has great visual impact.  

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This is a colourful site.  

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This site is fun, visually speaking.  

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This site is visually dynamic.  

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This site is the closest to my preferred style.  

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The design of the site looks European.  

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This site looks feminine.  

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This site looks feminine.

The final page, Thank you for your help and co-operation again.
The differentiated nature of visual power

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The differentiated nature of visual power


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The differentiated nature of visual power


