

# 文化與教育背景差異之網頁美學感知研究

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## 摘要

根據研究報告指出關於人類視覺張力的相關刺激，左右人們對於美學感知的抉擇。就網頁視覺設計領域而言，量測視覺張力所構成的因子，有助於預測有效的美感組成元素，以吸引使用者的注意力。

然而，本研究發現：人們對於視覺張力的感知，並非固定或具一致性，而是因人而異。藉由探討使用者美感評價的各項變因，歸納網頁視覺的設計美感影響因素，作為有效傳達與溝通建議之基礎。

本研究取樣自澳洲與台灣兩地，就讀視覺傳達設計與資訊科技系的大學生為調查對象。透過 Kress and van Leeuwens (1996)兩位學者所歸納出的四種視覺規範為基礎，作為量測的規範指標，這些規範分別為：技術性規範、感官性規範、抽象性規範與自然主義規範。Cleveland (2005)曾利用這些規範量測雜誌設計的視覺張力。本研究藉由這些規範，建立起關鍵性的因素分析，以探討網頁設計的視覺美感與使用者偏好抉擇的關係。問卷調查以李克 10 點量表為基礎，量測使用者對於網頁視覺設計感知上的反映回饋。統計結果歸納出兩項主要影響因子，首先是活力的刺激因子，其次為美感訴求因子。這些因子隨文化背景差異與教育背景不同等變因，產生視覺訴求的互異現象，這些結果將作為網頁設計者有效的參考建議。

關鍵字：美感、網頁設計美感、文化差異、教育背景

# 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 Leeuwens' coding orientation for visual modality, that is, abstract coding, naturalistic coding, sensory coding and scientific/technological coding (1996). 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.

Keywords: Aesthetics, Web Aesthetics, Cultural Differences, Educational Background

# 1. Introduction

Contemporary media exposes people to a vast array of visual stimuli (Forlizzi 2002). 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, performative 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), 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) 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: 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). 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.

## 2. Literature Review

### 2-1 Aesthetics and the visual power of website presentation

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).

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). 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.



Figure 1: Eight criteria for improving the quality of user experience in the computer interaction design. (Alben 1996)

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). According to Berlyne (1971), three types of stimulus properties contribute to arousal potential. Steenkamp et al, in a discussion of Berlyne’s work, they are: Psychophysical properties, Ecological properties, and Collative properties (novelty, incongruity, complexity).

Berlyne takes his definition of *arousal* further in ‘Pleasure, Reward, Preference’ (1973), 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). 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.

### 2-1-1 Levels of noise: the construction of visual power

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.

### 2-1-2 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 Slater (1979) 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 (2003) 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.'

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 (1976) 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 inscribed in a particular object.' (Robertson 2001) 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? Kogan (1994) 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.

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.

### 2-1-3 Aesthetics and visual power

The term *visual power* was first defined by Baird (1993) 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). Consequently, a visual preference is a pattern drawn from one's 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 outlined in *Reading Images: The Grammar of Visual Design*. According to the analysis of the icon (Goguen 2003), 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. 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.

## 2-2 Aesthetic function in visual communication design

Frascara (2004) 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). Baudrillard (in Featherstone 1991) 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.

Featherstone (1991) 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), and life experience (Featherstone 1991). 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) 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.

If a design is aesthetically meaningful to the user, it will have emotional appeal and be more effective (Whitfield 2000). As we shall see in this research, the audience makes this connection through visual preferences.

It is in the user's aesthetic judgement 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) as 'the third sense of the aestheticization of everyday life'. Forlizzi (2002) 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.'

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.

### 2-3 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-hikers 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.



### 2-3-1 Visual elements in a graphic visual presentation

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). 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 artbased 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). The practical application of these elements will be illustrated through some contemporary examples from commercial culture.



Figure 2.1

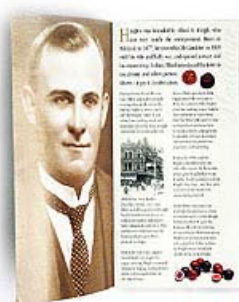


Figure 2.2



Figure2.3

Figure 2.1: The brochure cover of HAIGH'S chocolate company.

Figure 2.2: The first page of HAIGH'S brochure.

Figure 2.3: The enlarged version of the first page of HAIGH'S brochure.

Visual elements in a design work, 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.

### 2-3-2 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 :



Figure 3.1  
Brochure of the production of  
HAIGH'S Chocolate



Figure 3.2  
Brochure of the history of  
HAIGH'S Chocolate



Figure 3.3  
Website of HAIGH'S Chocolate  
<http://haighschocolates.com.au/>  
downloaded on 11/03/2007

## 2-4 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.

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) 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 4 below.



Figure 4: From left to right: Scientific/Technological-coding orientations, Sensory-coding orientations, Abstract-coding orientations, and Commonsense-naturalistic-coding orientations.

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.

## 2-5 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.

## Site A: Technological-coding orientations



Figure 5: **ScreenBeans** <http://www.bitbetter.com/powertips.htm> downloaded on 19/10/2006

ScreenBeans 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.





Figure 6: Site A - Technological coding orientations.

Figure 6 is 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.

### Site B: Sensory-coding orientations



Figure 7: Chocolate.com <http://www.chocolate.com/> downloaded on 20/10/2006

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 8: 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





Figure9: Windows <http://www.microsoft.com/en/au/default.aspx> downloaded on 10/4/2007

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.



Figure10: Site C - 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

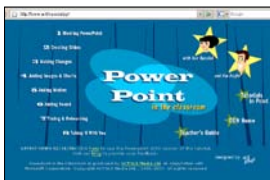


Figure 11: **actden** <http://www.actden.com/pp/> downloaded on 18/9/2006

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.

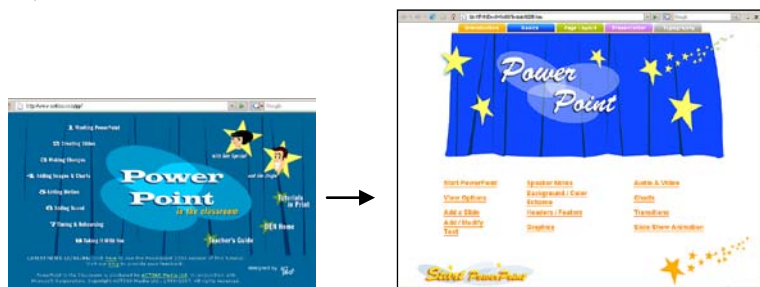


Figure12: SiteD - The commonsense naturalistic coding orientations.

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.

### 3. Research Methodology

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 1: Background characteristics of subjects

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

Four web sites were designed based upon Kress and van Leeuwen’s (1996) four types of visual presentation. 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 visual presentation, and not to validate Kress and van Leeuwen’s (1996) typology. The four stimuli are given in Figure 13~16.



Figure 13: Site A – Scientific/Technological coding



Figure 14: Site B - Sensory coding





Figure 15: Site C - Abstract coding



Figure 16: Site D - Naturalistic coding

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 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.

## 4. Discussion and findings

### 4-1 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 professions?
- Q4: Are there differences between grades?
- Q5: Are there gender differences?

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 at  $p < 0.001$ .

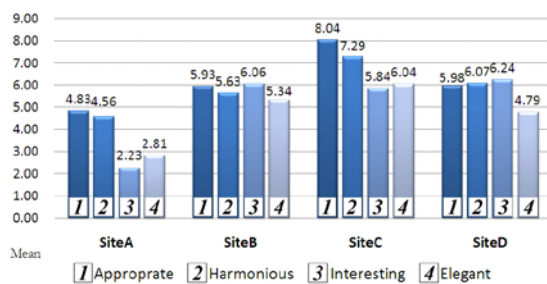


Figure 17: Graph of the means from question 1 to question 4 of each site.

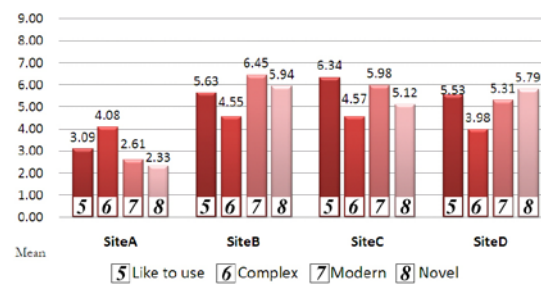


Figure 18: Graph of the means from question 5 to question 8 of each site.

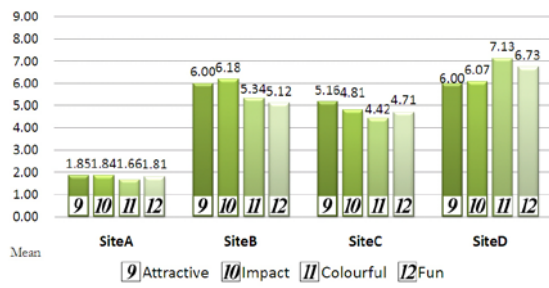


Figure 19: Graph of the means from question 9 to question 12 of each site.

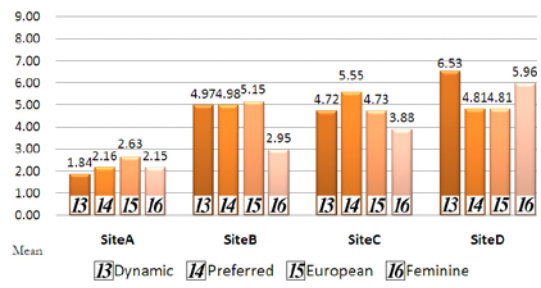


Figure 20: Graph of the means from question 13 to question 16 of each site.

#### 4-2 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 2:

Table 2: Descriptive statistics of items

Items	Mean	Std Deviation (SD)	Items	Mean	Std Deviation (SD)
Q2	6.20	2.93	Q10	4.75	3.17
Q3	5.89	2.81	Q11	4.72	3.15
Q4	5.09	3.10	Q12	4.64	3.17
Q5	4.75	2.87	Q13	4.59	3.09
Q6	5.15	3.08	Q14	4.52	3.04
Q7	4.30	2.68	Q15	4.38	3.19
Q8	5.09	3.03	Q16	4.33	2.98
Q9	4.79	2.98	Q17	3.74	2.90

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 4 below.

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 Zaltman & Burger (Zaltman 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.

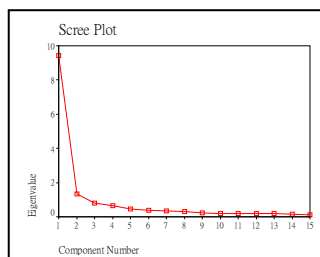


Figure 21: Graph of Scree Test

### 4-3 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 23, 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 24, 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 3.

Table 3: Naming, eigenvalue, variance explained, cumulative variance explained of website visual factor dimensions

Factor	Naming	Eigenvalue	Variance explained%	Cumulative variance explained %
Factor One	<i>Dynamic Impact</i>	5.85	39.01	39.01
Factor Two	<i>Aesthetic Appeal</i>	4.93	32.83	71.84

Table 4: List of questions for the two factors.

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

The independence of these two dimensions is indicated in Figure 22.

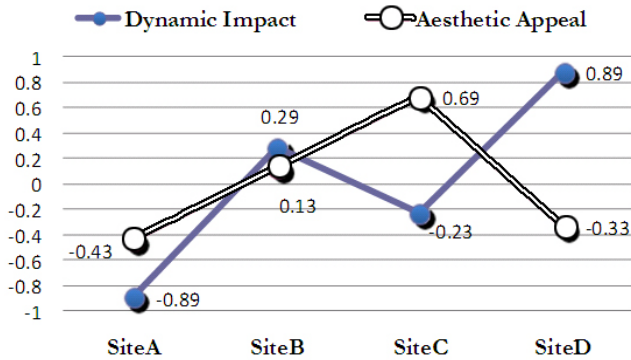


Figure 22: Dynamic Impact and Aesthetic Appeal as independent dimensions

Table 5: Descriptive statistics of website visual factors of variables below standard

Factor	N	<i>Dynamic Impact</i>		<i>Aesthetic Appeal</i>	
		Mean	Std. Error of Mean	Mean	Std. Error of Mean
<b>Nationality</b>					
Australia	856	-.05	.03	-.24	.04
Taiwan	844	.06	.04	.24	.03
Total	1700	.00	.03	.00	.03
<b>Profession</b>					
Communication Design	896	-.19	.03	-.13	.03
Information Technology	804	.21	.04	.16	.04
Total	1700	.00	.03	.00	.03
<b>Grade</b>					
First Year	800	.06	.04	.11	.04
Final Year	900	-.05	.03	-.10	.03
Total	1700	.00	.03	.00	.03
<b>Gender</b>					
Female	844	-.06	.04	.02	.04
Male	856	.06	.03	-.02	.04
Total	1700	.00	.03	.00	.03
<b>Site</b>					
Site A	425	-.90	.03	-.43	.04
Site B	425	.27	.04	.11	.05
Site C	425	-.25	.04	.68	.04
Site D	425	.87	.04	-.35	.05
Total	1700	.00	.03	.00	.03

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,  $p < .001$ ) and profession ( $F=62.0$ , d.f. 2,  $p < .001$ ). While the difference due to level of education is statistically significant, it is small ( $F=11.2$ , d.f. 2,  $p < .001$ ), 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 23) and *Aesthetic Appeal* (Figure 24), 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.

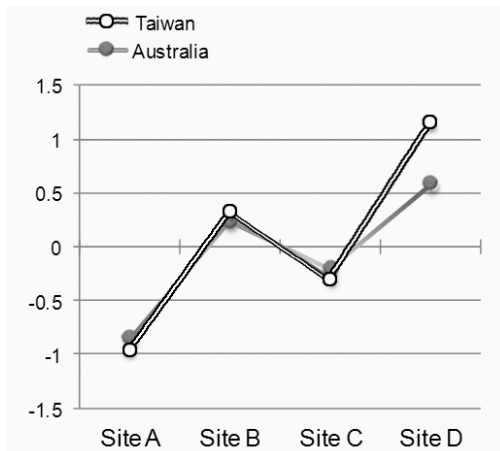


Figure 23: Dynamic Impact of the four sites to Taiwanese and Australian subjects

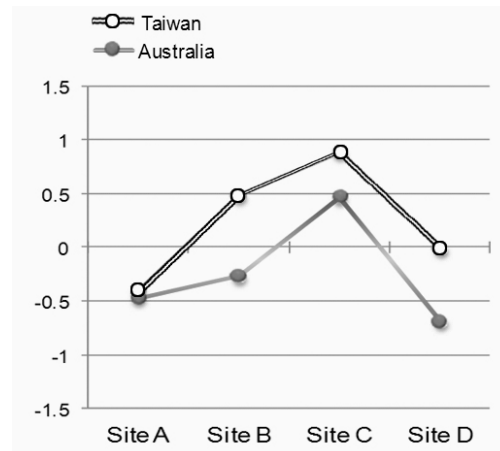


Figure 24: Aesthetic Appeal of the four sites to Taiwanese and Australian subjects

For profession, the Information Technology respondents consistently rate all sites higher for both *Dynamic Impact* (Figure 25) and *Aesthetic Appeal* (Figure 26). This effect has been observed previously, whereby IT respondents rated web sites higher than Design respondents on all measures (Haig & Whitfield 2001).

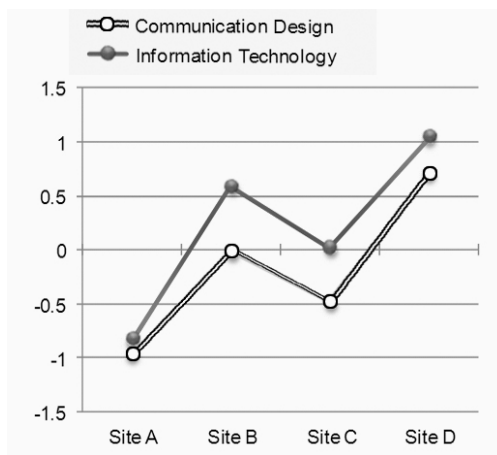


Figure 25: Dynamic Impact of the four sites to Communication Design and Information Technology subjects

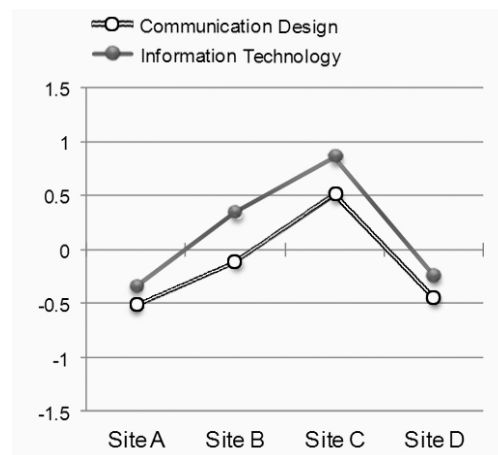


Figure 26: Aesthetic Appeal of the four sites to Communication Design and Information Technology subjects

#### 4-4 Theoretical and Empirical Implications

The results show clear differences in the evaluation of web sites between Taiwanese and Australian, and 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. 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 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. 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.

## 5. Conclusion

This study's focus upon web sites is somewhat incidental. 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, 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.

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