



Picture perfect: Girls' and boys' preferences towards visual complexity in children's websites



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ABSTRACT

This experiment examined children's aesthetic preferences for websites designed for them. It applied Berlyne's theory of aesthetic preference to these websites: a theory that suggests that people prefer a medium level of stimuli to a low or high level of stimuli. The experiment used a 2×3 between-subject design and involved 45 boys and 45 girls. In the experiment the children were asked to rate 12 children's learning websites for aesthetic preference. The websites had been classified according to whether they displayed a high, medium or low level of visual complexity. The results of the experiment showed that overall the children preferred websites that displayed a medium level of visual complexity to those that displayed a high or low level of visual complexity. Thus the results supported Berlyne's theory. However, when the children's ratings were analysed with respect to their gender, it was found that the boys preferred a high level of visual complexity and the girls preferred a medium or low level of visual complexity. In other words, Berlyne's theory was partly supported. Further analysis revealed other gender related aesthetic preferences. This paper should be of interest to anyone who designs learning websites for children.

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1. Introduction

The Web has become a ubiquitous information and communication tool. As the Internet user population is continually increasing, it is becoming important for web designers and stakeholders that host websites deliver a good user experience for people. Although many studies in the field of web design have been conducted into usability, resulting in numerous design guidelines (e.g. Nielsen, 2000; Shneiderman, 1998), many of the subjective aspects have, until recently, been neglected. One subjective aspect which has started to receive attention is that of visual appearance. Research conducted in this area includes studies into: first impressions (Lindgaard, Fernandes, Duduk, & Brown, 2006); the aesthetic judgments of first impressions (Tuch, Presslauer, Stocklin, Opwisa, &argas-Avila, 2012); and the importance of aesthetics with respect to the context of the website (van Schaik & Ling, 2009). Although much of this research is still in its infancy, and little refers to children, there does seem to be evidence that visual aesthetics critically affect how a user perceives a website in terms of ease-of-use and interaction enjoyment (e.g. Hassenzahl, 2004; Van der Heijden, 2003).

One of those factors which influence visual aesthetic preference is visual complexity. Its impact on aesthetic preference is very well documented in numerous publications (e.g. Kartiko, Kavakli, &

Cheng, 2010; Michailidou, Harper, & Bechhofer, 2008; Pandir & Knight, 2006; Tuch et al., 2012), but knowledge about the influence of visual complexity on children's websites, and their aesthetic preference, is limited. Another point that needs clarification is whether there is any correlation between aesthetic preference and children's gender. Previous studies have looked at gender difference in website design preference, blog interface preference and aesthetic perception (Cyr & Bonanni, 2005; Hsu, 2012; Simon, 2001). Nevertheless, studies investigating aesthetic preference with respect to children are rare. Thus, it is important that researchers, practitioners and children educators explore possible interactions between aesthetic variables and gender effect in children's websites as the findings may help designers develop more appropriate websites for children.

Therefore, this study aims to explore the relationship between visual complexity, aesthetic preferences and gender differences and their effect on children's websites. It was conducted to test Berlyne's theory on aesthetic preference which suggests that people prefer medium stimuli to high or low stimuli. It also tests whether there are gender effects in children's websites. The research questions in this study are:

- (1) Do the different levels of visual complexity have an impact upon children's aesthetic preferences with regard to children's websites?
- (2) Are there gender differences in relation to aesthetic preferences in children's websites, and what aesthetic preferences contribute to these differences?

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- (3) Is there an interaction between different levels of visual complexity and gender differences in relation to aesthetic preferences in children's websites?

To setup a framework, an overview of the influence of visual complexity on aesthetic preference, and a brief introduction to Berlyne's experimental aesthetic theory was given; this was followed by a report on the measurement of the impact of visual complexity on aesthetic preference and gender difference in aesthetic perception.

2. Background of study

2.1. The impact of visual complexity on aesthetic preference

Early studies in experimental aesthetics led to several theories, the most influential of which was formulated by Berlyne (Martindale, Moore, & Borkum, 1990). Berlyne (1971, 1974) proposed an important theory that has dominated experimental aesthetics for several decades. According to Berlyne's model, aesthetics relates to a number of so-called 'collative variables', where each person's pleasure is related to the arousal potential of a stimulus. This relationship is linked to the Wundt (inverted-U shape) curve for pleasure, with a linearly increasing line for the arousal potential of a stimulus. One prediction of the model is that medium levels of stimulus would be preferred, whereas stimuli with low and high arousal potentials are less pleasant. According to his theory, arousal potential is linked to collative properties such as complexity, novelty, and hedonic value. Among those properties, visual complexity plays a crucial role in the perceived aesthetic preference (Michailidou et al., 2008; Pandir & Knight, 2006; Tuch, Bargas-Avila, & Opwis, 2010a). A number of experiments have been conducted with respect to users' preference and perceived visual complexity. In a study of children's aesthetic preferences for websites, Wang and Bowerman (2012) showed that children preferred both classical and expressive aesthetics of a medium level of perceived visual complexity, supporting Berlyne's theory. A similar result was found in research by Kaplan, Kaplan, and Wendt (1972), who conducted an experiment to evaluate viewers' perception of photographs. The images were of rural and urban landscapes and it was found that the photographs of rural settings were preferred to the urban ones. However, when each type of photograph was analysed separately there was a positive linear relationship between preference and complexity. They concluded that people desire landscapes which contain a moderate degree of complexity. Geissler, Zinkhan, and Watson (2006) tested Berlyne's theory in a study of users' attitudes towards home pages with respect to perceived visual complexity. The researchers found that users responded more favourably to websites with a medium level of perceived complexity than to those with a high or low level of perceived complexity and concluded that the findings of their study supported Berlyne's theory. Ochsner (2000) found a negative correlation between visual complexity and affective valence, and a positive correlation between visual complexity and arousal in photographs which were a part of the IAPS (International Affective Picture System).

However, in another study that also tested Berlyne's theory, Pandir and Knight (2006) emphasised the effects of individual differences in personal interests and tastes on preferences through an experiment using screenshots of 12 homepages. According to the researchers, a negative correlation between complexity and pleasure in website perception was found; therefore, they could not directly support Berlyne's theory. However, from an analysis of participants' verbal reports, they confirm Berlyne's definition of objective complexity which supports the idea that people have

similar understandings of complexity. The study also indicated that individual differences in taste and lifestyle are highly personal factors that influence aesthetic preference. In a recent study, Tuch, Bargas-Avila, & Opwis, 2009, in a test that looked at both cognitive and emotional issues, found that websites with a low level of perceived complexity were preferred. Furthermore, Ben-Bassat, Meyer, and Tractinsky (2006) provided a demonstration of the context dependency of aesthetic perception. They found that participants did not rank beauty as the main predictor of aesthetic perception. This result was consistent with that of another study by van Schaik and Ling (2009). They investigated the effect of context in webpages on aesthetic perception and found that the perceived aesthetics value increased when the website provided context. These disparate findings arguably limit the use of previous research when attempting to predict the aesthetic preferences of children when visual complexity is a factor on learning websites, and suggest that more research in this area is needed.

2.2. Measuring the visual complexity of websites

There are many different aesthetic theories related to preference and beauty. Most of the literature agrees that aesthetics are the combination of objective and subjective elements (Ashford, 1969; Berlyne, 1971; Martindale et al., 1990). For instance, when people describe a painting, they can mention the colour, line, and shape of the painting, which can be perceived by anyone. These are the objective elements in aesthetics (Hanfling, 1992). On the other hand, the subjective elements are the preferences for the painting which are the physiological and psychological aspects of the viewing experience. Subjective elements depend on individual difference and will change over time. Tilghman (2004) suggests that to closely evaluate subjective elements we need to base our analysis on people's sensibility, education and taste. Despite the differences between objective and subjective elements of aesthetics, one should view them holistically. In this research, we try to evaluate children's preferences with regard to the subjective elements of aesthetics for a children's website, and we chose some websites which contain different levels of the objective elements (complexity), in an attempt to assess aesthetic preference. One way to assess the complexity of an image is to analyse the elements of that image and to manipulate the number of elements according to the level of complexity. Michailidou (2008b) developed a metric to count the different levels of visual complexity of a website. According to their research, visual complexity is the degree of difficulty in providing a verbal description of an image. Therefore, descriptions of the complexity of an image might include the number of objects, clutter, openness, symmetry, organization, and variety of colours. Based on this theory, they analyse the website's visual complexity in terms of the density and diversity of the elements on the page. The current experiment employed this same metric to divide the sampled children's learning websites into three levels of visual complexity (high, medium, and low).

2.3. Gender difference in aesthetic perception

The importance of aesthetics has been well documented in the field of psychology research (Cyr & Bonanni, 2005). However, only a few studies have focused on gender differences in aesthetic perception and web site design preferences (Cyr & Bonanni, 2005; Simon, 2001). An early piece of research conducted by Frumkin (1963) found that females had a greater appreciation of modern painting than their male counterparts. More recently, Cyr and Bonanni (2005) found that men and women had significantly different responses to the visual appeal of a website. Men had more impressed by how site organization and product information were

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