

# THE AFFECTIVE ENVIRONMENT: A NEUROEVOLUTIONARY PERSPECTIVE

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## ABSTRACT

*An important function of the constructed environment is to provide what Vitruvius termed 'delight'. Unraveling this elusive function traditionally fell within the domain of philosophy, though its success in so doing is hardly impressive. In the late nineteenth century the field of 'delight' – or aesthetics, as it came to be known – was embraced by empirical psychology. Following its preoccupation with 'art', during the 1970s attention was given to the constructed and the natural environment. However, as Appleton (1975a) reasonably observes, it was conducted in a "theoretical vacuum". This vacuum has since been filled. A powerful explanatory model emerged with a neuroevolutionary perspective that allied Darwinian evolutionary theory with recent advances in such fields as cognitive neuroscience. This article traces the advent of scientific method in this field. It outlines the neuroevolutionary perspective and three affective theories derived from it that purport to explain 'delight'. In combination they provide opportunities for research into the affective environment and particularly the tropical environment, a surprisingly neglected area given its evolutionary significance. The intention is to encourage research within this new affective paradigm.*

**Keywords:** *Environmental Aesthetics, Emotion, Affective Environment*

## 1. INTRODUCTION

As asserted by Vitruvius 2000 years ago, one of the functions of the built environment is to provide 'delight' (Rowland, 1999). This function has been a continual source of interest to architectural historians and theorists since the Renaissance, and has generated a vast literature covering styles of architecture, their symbolic associations, and their components such as proportion, decoration and colour. Within this, attempts have been made to distil the essential features of 'delight' via formulas and aesthetic codes of practice. The most well-known formula is the Golden Section, though a plethora exists for colour under the guise of Colour Harmony. These range from Goethe's early attempts, through Chevreul, Munsell, and Ostwald to probably the most recent by two mathematicians, Moon and Spencer (Whitfield and Slatter, 1978). Interestingly, an 'average' of these colour formulas provides the theoretical underpinning of the most comprehensive set of building colour standards available today, the British Building Colour Standards (Gloag and Gold, 1978). Aside from formulas, codes of practice have been formulated to guide architects and planners in the achievement of 'delight'. A notable example came from the English county of Essex, termed the Essex Design Guide, in which visual examples of how to achieve 'delight' were illustrated alongside examples of how not to (County Council of Essex, 1973). Anyone familiar with the strict planning laws of the UK will appreciate the importance of complying with such codes of practice – if they want planning approval.

A feature of such formulas and codes is that they represent attempts to identify laws governing 'delight'. Their justification takes various forms from the metaphysical to the apparently observational. The Golden Section fits the latter, with a lineage going back to Ancient Greece. An essential feature is that they are deductive; they come from a philosophical world view in which order can

be detected, and its very detection appears evidence enough of its validity. This view is still with us and remains intact within architectural and design education. However, it was severely challenged by developments in late nineteenth century Germany, leading to the advent of modern empirical psychology. What follows traces the advent of scientific method in this field, its application initially to the fine arts, and later to the constructed and natural environments. Its most recent manifestation, a neuroevolutionary perspective, is presented along with three competing theories that would purport to explain 'delight'. These provide opportunities for research into the affective environment.

## 2. FECHNER AND THE SCIENTIFIC PURSUIT OF 'DELIGHT'

The main agent of change and opponent of the deductive tradition was Fechner, the father of experimental psychology. Fechner was a physicist who turned his attention to the mental and, to him, the spiritual world. Being a physicist of scientific training he naturally employed such empirical methods to investigate 'mental' phenomena. The first area of scientific enquiry was what is now termed psychophysics, namely the relationship between physically measurable elements such as the amplitude of sound and human perceptions of sound (Fechner, 1860). Significant to the argument advanced here, the second area of experimental psychology to develop was in the area of 'delight' (Fechner, 1871). As a trained empiricist, Fechner sought to test supposed laws of 'delight' using scientific method. He proposed three methods: the *method of choice*, in which people report on the pleasingness of objects; the *method of production*, in which people produce an object or design by manipulation of components according to taste; and the *method of use*, in which aesthetic objects are analysed to detect their affective origin. The first, the method of choice, came to dominate research in what became known as the field of experimental aesthetics.

Since Fechner's origination of this field a vast body of research findings has accumulated in what has become a branch of psychology. Numerous formulas and codes of practice have been subjected to experimental testing with results that are rarely supportive. Thus the Golden Section has been compromised (Berlyne, 1971; McManus, 1980), formulas for Colour Harmony simply do not work (Whitfield and Slatter, 1978; Whitfield and Wiltshire, 1990), and, for example, the Essex Design Guide mentioned above fails alarmingly when subject to empirical verification. In other words, neither design trained nor lay people's aesthetic judgments agree with those contained in the Guide (Whitfield, Harrison, Morrison and Wiltshire, 1980).

While originally concerned with the laws pertaining to art, the field broadened during the 1960s to include the built environment and the natural environment. This reflected the emergence of environmental psychology as a further branch of psychology (Canter, 1977; Downs and Stea, 1973). It also reflected serious social problems associated with new urban developments that were springing up in Europe and North America (Newman, 1972). These were driven by a modernist agenda with a lineage tracing back to Le Corbusier. Aside from a concern with social problems associated with building and urban design, it led to an interest in how ordinary people perceive and evaluate both the built and the natural environment and, via this, to the investigation of what is broadly termed environmental aesthetics (Kaplan and Kaplan, 1989; Nasar, 1988).

Within psychology the 1970s and 1980s are characterized by the transition from Behaviourism to Cognitivism. Effectively, the mind was rediscovered following its exile under Behaviourism. While behaviours clearly could be measured, so also could the activities of the mind. Coupled to this was the emergence of a raft of new disciplines united by an evolutionary perspective and an embrace of new findings on brain function. Prominent amongst these are cognitive neuroscience (Damasio, 1994; LeDoux, 2002), evolutionary psychology (Buss, 1999; Tooby and Cosmides, 1992), and evolutionary biology (Dawkins, 1976; Sober and Wilson, 1998). They provided a new set of perspectives that fed through into an understanding of that most elusive of functions of the environment, 'delight'.

## 3. A NEUROEVOLUTIONARY PERSPECTIVE

Early empirical research sought to understand the role of visual components – line, colour, proportion – in explaining delight. This atomistic approach, characteristic of Behaviorism, was eventually compromised in favour of more cognitive components such as style, and attempts were made to align research with neuroevolutionary theory. Essentially, the question changed from what formulas or codes of practice deliver delight to: What is delight for? Why do we have it? What causes it?

A guiding principle of neuroevolutionary theory is that the answers to many questions lie in our survival as a species over the five million years that our hominid ancestors walked the planet. As a minor species with little natural protection from predators our ancestors evolved skills and capacities that



*Figure 1: Influence of the water bottle on perceptions of the person.*

enabled their survival (Ehrlich, 2000). For example, our ancestors and their descendents - modern humans - had small claws, small teeth, could not fly or run fast. They were no match for predatory species such as large cats. Their success rested therefore upon other capacities that they developed. One essential capacity was their formation into groups. Sheer numbers would deter predators, and their organization into stratified groups would enable them to hunt and to compete with other hominid groups (Barret, Dunbar and Lycett, 2002). Therein lies the origin of societies as we know them.

At a more fundamental level our ancestors evolved the neural machinery for detecting threats, and doing so at incredible speed. What characterizes humans is that they process information quickly and can access a memory bank of external objects in the environment that provides crucial information on these objects. This system of neural classification was essential for identifying both threats and opportunities. It was also essential to compensate for our obvious physical weaknesses. As indicated, our physiology makes us no match for the species that would regard us as food. So, we specialized in speed of processing and access to our sophisticated memory bank of objects and their performance characteristics. Unfortunately – or perhaps fortunately, given that our ancestors

survived – we inherited an emotion system that is less sophisticated, older in evolutionary terms, and extremely powerful: the vestiges of the reptilian brain remains with us (Le Doux, 2002).

Over the past two decades emotion has emerged as a dominant force within psychology and those disciplines allied to it. Within the broad field of design it has found application most clearly in industrial or product design. The recently formed Design & Emotion Society reflects this progeny, as does a range of publications in this product-emotion area. Notable is the work of researchers at Delft University of Technology, Netherlands. They have investigated the emotional characteristics of such everyday items as electric toasters and kettles (Hekkert, 2006; Hekkert, Snelders and van Wieringen, 2003). Another example within this genre is from the author of this article. It involves the application of a phenomenon from environmental psychology called the Room Effect, to products. The Room Effect refers to the influence the environment has upon how an occupant is perceived (Canter, West and Wools, 1974). The same person seen (photographically or digitally) in different settings acquires some of the characteristics of that setting. Thus, someone seen in a warm and affluent room is judged warm and affluent. The author's

research is extending this into the effect of products – the Product Effect. From pilot work this effect extends to motor cars, motorcycles and bottled water. Regarding the latter, the design of the bottle confers its characteristics upon its owner. In the example in Figure 1, the male is seen as less *masculine* with the slim bottle and also less *sporty*. Personality traits and social aspects change significantly including perceived *elegance*, *stylishness* and how much the person appears *open to new ideas*. Notice that the only variable in the two digital images is the water bottle: everything else is constant.

From a neuroevolutionary perspective the environment would be a primary source of emotion. Not only is it the setting in which encounters with predators and food occur, but also a source of danger or security in itself. The kinds of environments that we favour are known. They provide refuge (Appleton, 1975b), imageability (Lynch, 1960), and place attachment (Altman and Low, 1992) – in other words we know where we are and where we are safe. Potentially dangerous environments lack refuge and clear vantage points. As a visually-based species we need to have clear visual access to what is going on around us. From this perspective the jungle is threatening, as are vast expanses without vegetation to provide refuge. Imagine the likelihood of survival against a pride of lions when exposed within a vegetationless expanse. These emotions are probably imprinted within our species – as is a fear of the dark: our poor scotopic vision renders us helpless in the dark. An interesting species contrast is with spiders. Their preferred environment will be complete darkness. Why? Daylight spells almost certain death to spiders. Their great predators, birds, have superb daylight vision – and spiders are both defenseless against them and highly nutritious. In the context of the built environment the same brain leanings will prevail. After all, if we equate our evolutionary timeframe of five million years with one hour, then we have had buildings for slightly over one second. The constructed environment is a very recent phenomenon for the human species.

#### 4. RECENT AFFECTIVE THEORIES

The neuroevolutionary revolution over the past two decades provides significant opportunities for affective research into the constructed environment. In particular, opportunities are available for unraveling that most elusive of commodities, ‘delight’ – or aesthetics, as it is now termed. A number of empirically-based theories exist that are underpinned by a neuroevolutionary perspective. These theories are process-driven, as distinct from stimulus-driven. As such they reject simple laws such as Colour Harmony and the Golden Section, and focus instead upon the processes underlying aesthetic appraisal. They distinguish between wired-in preferences and acquired preferences, and acknowledge emotion as fundamental. Furthermore, they reject the idea of aesthetic appraisal as a conscious act. All focus upon a mediating stage between “emotions and the outer world” (Silvia, 2005), with their emphases reflecting their respective roots in emotion theory and cognitive psychology.

Significant amongst these is Appraisal theory. This seeks to articulate the structure of appraisal processes (Roseman and Smith, 2001; Scherer, 2001). It emphasizes the evaluation of objects, as distinct from the objects *per se*, and lays particular emphasis upon both the individuality of appraisal and its multifaceted structure. A feature of Appraisal theory is that the very act of appraising the object (building, environment etc) generates the emotion or affective response (Silvia, 2006). Another, the Processing Fluency model posits that ease of processing – fluency – generates positive affect (Reber, Schwarz, and Winkielman, 2004; Reber, Winkielman, and Schwartz, 1998). As familiar stimuli are more fluently processed than unfamiliar stimuli, then familiarity would generate positive affect (Winkielman, Halberstadt, Fazendeiro, and Catty, 2006). Finally, the Categorical-Motivation model amalgamates two conflicting theories derived from Berlyne (1971) and Whitfield (Whitfield, 1983; Whitfield and Slatter, 1979). It emphasizes the type of object category accessed in aesthetic appraisal, and accounts for preference for both unfamiliar and familiar stimuli (Whitfield, 2000, 2009).

A further characteristic of these theories is that they have received little empirical attention in application to either the constructed or natural environments. As such, they provide opportunities for empirical research. In addition, an area of distinct neglect, and one perhaps pertinent to readers of this journal, is the tropical environment – both constructed and natural. Given the key evolutionary significance of this environment to our species, this neglect generally within the field of environmental aesthetics is surprising. A probable explanation is that economically developed countries rarely are tropical, and that research in such countries tends to reflect local environmental interests.

## 5. CONCLUSIONS

Appleton's contention in 1975 that environmental research was conducted in a "theoretical vacuum" (Appleton, 1975a) is no longer valid. The coming together of two major research streams provides a strong theoretical foundation. One derives from the Darwinian evolutionary position, and the other from advances in such fields as cognitive neuroscience and evolutionary psychology. In combination they provide a powerful explanatory model, and one that offers new opportunities for research into the affective environment. Given our evolutionary antecedence, the tropical environment has a special significance, and one that has received surprisingly little research attention. The purpose of this paper is to encourage such attention.

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