

# Psychophysiological Responses in an Environment of Indeterminate Form

GERALD I. ANDERSON  
University of Tennessee

## INTRODUCTION

Indeterminate forms are those forms that are complex, indistinct, vague, blurred, broken, ambiguous, and non-specific. Indeterminate forms may be found in nature, in art, in music, in poetry, and sometimes in architecture.

Evolutionary biologists indicate that people have a genetic predisposition toward things in nature (and the nature-like) and that interaction with such things is important to a coherent and fulfilling existence. Interaction with nature engenders psychophysiological reactions such as a liking/approach response, a restoration or stress recovery response, and enhanced high-order cognitive functioning. It is proposed that these responses may be elicited in an environment made up of nature and an architecture of man-made indeterminate form. Architecture utilizing an indeterminate form vocabulary may engender some of the same positive reactions and responses as does nature.

Because nature is largely made up of indeterminate forms, it is proposed that an architecture using this form language may establish a neutral continuum with the natural environment. In an age of concern for the environment and sustainability, an architecture of indeterminate form may be seen to have a less detrimental impact on our surroundings than current "strong-form" architecture.

## INDETERMINATE FORMS

Indeterminate forms are those forms that are difficult or impossible to perceive or grasp with the conscious mind. They may generally be described as being complex, indistinct, obscure, vague, blurred, unfinished, ethereal, broken, ambiguous, and non-specific (Ehrenzweig, 1965). Indeterminate forms may be found in nature, in art, in music, in poetry, and sometimes in architecture.

Determinate forms, in contrast, are those "good gestalt" forms that are more easily perceived and assimilated. They are whole, complete, fixed, closed, integrated, organized, solid, definite, comprehensible, and assertive. The "law of the good gestalt," as formulated by Wertheimer, "describes a striving, inherent in physical and psychical entities, toward

the simplest, most regular, most symmetrical structure attainable in a given situation" (Arnheim, 1986). Most current architecture is made up of a vocabulary of determinate forms.

Indeterminate forms are the primary language of nature. Smoke, fire, water (particularly water in motion), fog, mist, clouds, trees, forests as a complex of trees, and landscapes in general are largely indeterminate. It may be said that these elements lack focus, and although it is possible to perceive them in a general way, a precise fixed or focused image is not possible. To view a forest or even a small grouping of trees, one would encounter complex textures of leaves, twigs and branches comprising a variety of forms and shapes (all viewed from a variety of perspectives), spatial depth (perceived through binocular vision, the diminishing of the size of the parts with distance, the overlapping of elements, and the phenomenon of atmospheric perspective), and a variety of shades, shadows, and colors, all possibly complicated by the element of motion. If one were to try to draw or paint such a scene in nature, it would be necessary to "typify" or "approximate" the image, usually incorporating some form of symbolic representation (e.g. a sort of scribbling texture to represent leaves in a wooded scene). Although the structure of nature in general, and the organic aspect of nature in particular, is based on the highest principles of orderly organization, the rough-grained, macro-level views of many aspects of nature are indeterminate.

## GENETIC PREDISPOSITION TOWARD NATURE AND INDETERMINATE FORMS

Life is the creation of an autonomous process in which new variations in the genetic hereditary material continuously arise. Some survive and reproduce better than others and, as a result, organic evolution occurs. Stated more simply: natural selection acting on mutations produces evolution. Evolutionary biologists today argue that the brain must also be regarded as a product of evolution through natural selection, like other organs of the body. Beyond the evolution of the brain as the organ of the mind is the realization that

certain aspects of the operation of the mind and concomitant behavior are also genetically determined. "We are at the dawn of human behavioral genetics, when the first efforts are being made to discover and characterize the genes that guide the development of more complex forms of behavior and thought" (Lumsden and Wilson, 1983).

Because of the origin of man through evolution in the natural environment, the mind is biologically intertwined with nature (Balling, 1982), with the primordial environment from which it evolved. According to Wilson in his biophilia hypothesis, people have an innate tendency to focus on life and lifelike processes, and to nature. The hypothesis states that "the widest valuational affiliation with life and the lifelike processes (or nature) has conferred distinctive advantages in the human evolutionary struggle to adapt, persist, and thrive as individuals and as a species" (Kellert and Wilson, 1993). The biophilia hypothesis asserts that much of the human search for a coherent and fulfilling existence is intimately dependent upon our relationship to nature.

Gordon Orians and others have independently suggested that the mind is predisposed to life in the prevailing original habitat in which the brain evolved. For functional/evolutionary reasons, people prefer and work hard to create savanna-like environments: open spaces but not a barren landscape, some amount of order in the surrounding vegetation, but less than geometric perfection, topographical relief (high places), and the presence of water. Given a completely free choice in habitat selection, we gravitate statistically toward this sort of environment and a considerable body of evidence substantiates this preference in landscape and architectural design (Orians, 1980). Similarly, Hildebrand has shown that people have a genetic predisposition towards architecture possessing qualities of "prospect" and "refuge" (the desire to be above and to be able to view the immediate surroundings from a high point of safety) and cites examples of many of Frank Lloyd Wright houses that incorporate these qualities. He also discusses a genetic preference for architecture displaying a number of other qualities such as complexity (Hildebrand, 1991).

The genetic predisposition toward things natural (Kaplan and Kaplan, 1989) also applies to things that are "natural-like." In this regard, the "natural" domain appears to be broad for people in industrialized societies, extending considerably beyond nature (Kaplan et al, 1972). There is a distinct interest in such "nature-similes" as landscape paintings, photographs of nature, and other artificial representations of nature such as silk flowers or stuffed animals. In windowless offices people tend to surround themselves with paintings and photographs of things natural. Much of the research on comparative responses to natural versus man-made (urban) environments is implemented through the use of photographs (revealing a preference for photographs of nature over photographs of man-made settings). Although the extent of genetic predisposition for "life-like" or "nature-like" things in the environment is difficult to measure, and

the degree to which "nature-like" is as satisfying as nature is an open question, it is clear that our relationship to the "nature-like" also contributes to the human search for coherent and fulfilling existence.

If the human mind is primed to respond most strongly to some narrowly defined qualities that had the greatest impact on survival in the past, it is plausible to reason that the genetic predisposition toward things natural and "nature-like" could extend to a genetic predisposition toward the form language of those things. The form language of those things in nature that tend to attract us may have its own distinctive attractiveness in and of itself. As an example, the genetic associative preference people have for water might be reduced to a preference for those indeterminate formal characteristics of water (e.g. fluidity, transparency, spatial depth, reflectivity, glossiness, and formlessness). The unconscious attraction toward trees might be interpreted as an attraction toward the indeterminate form qualities of trees (texture, variegated color, irregularity, spatial depth . . .).

Research has shed light on the visual configurations and elements that people respond to as "natural" (Kellert and Wilson, 1993), many of which would fall under the definition of indeterminate form. In very general terms, European, North American, and Japanese adult groups tend to respond to man-made elements as natural if they are mixed with natural elements and if the dominant visual contours or edges are curvilinear or irregular rather than starkly rectilinear or regular (Ulrich, 1983; Wohlwill, 1976). They prefer entities that are complicated, growing, and sufficiently unpredictable to be interesting (Wilson, 1984). Other examples support the notion of a subliminal attraction to forms that may be termed indeterminate, and modern evolutionary theory has added supporting evidence that this is indeed the case.

## PSYCHOPHYSIOLOGICAL RESPONSES TO NATURE AND INDETERMINATE FORMS

Ulrich proposes that biologically prepared learning (geneculture coevolution) may play a part in at least three general adaptive positive responses to unthreatening natural landscapes: a liking/approach response; a restoration or stress recovery response, and enhanced high-order cognitive functioning when a person is engaged in a nonurgent task. Each of these responses serves an evolutionary function (Ulrich, 1979). Considerable research substantiates the first two of these hypotheses and research to empirically evaluate the third is in progress (Kellert and Wilson, 1993). I propose the likelihood of similar responses to an environment comprising a combination of natural elements and man-made elements made up of the indeterminate forms found in nature.

Concepts of cognitive theory and behavioral theory have developed from a wide array of perspectives, many of which are empirical and highly speculative. Notable among them are the psychoanalytic philosophy in which the mind is seen as being made up of a conscious (surface) mind and an

unconscious (depth) mind (with a variety of levels in between), and a neuroscientific materialist philosophy in which the mind springs from a machinery of neurons created according to a genetic blueprint. In the psychoanalytic view, mental functions are thought to be the product of the interaction or interconnection of disconnected material within the lower levels of the mind, and the surfacing of those "thoughts" to awareness in the conscious mind (Mednick, 1982). In the materialist view, mental events are identical with physiological events in the brain in which electrochemical connections (nodal-linkages) are made between a network of concepts in the long-term memory system (which might be considered the parallel of the unconscious mind). Short-term memory (which may be considered the parallel of the conscious mind) summons information and ideas from the store of the long-term memory (Lumsden and Wilson, 1983).

Some psychologists argue that indeterminate forms are the medium and language of the unconscious mind and that indeterminate form experiences are an inherent part of the operational mechanism of the mind. It is theorized that the need for and tendency toward the aesthetically "good gestalt" belongs to the surface layers of the mind and is foreign to the "gestalt-free" depth mind (Ehrenzweig, 1965). An understanding or acceptance of these propositions regarding cognitive functions and behavior is not sufficient to enhance the process. Knowing that these transitive interactions must occur does not cause them to occur. One mechanism proposed for enhancing these mental processes entails immersion in nature (Knopf, 1987) or in an environment comprising a combination of nature and man-made indeterminate forms. Sensory exposure to indeterminate forms (natural or man-made) is thought to stimulate activity within the unconscious mind and between the conscious and unconscious minds as a result of the perception, processing, and storage of new indeterminate form material. Accordingly, thought and creativity may be induced or enhanced through an encounter with an architecture composed largely of indeterminate forms.

### INDETERMINATE FORMS AND ARCHITECTURE

Appropriate strategies for the creation of an architecture comprising indeterminate forms come largely from nature. Some of the strategies for producing buildable indeterminate forms in architecture would include the use of the following:

Forms and/or colors that lack contrast with the natural surroundings or provide insufficient data for clear perception; such strategies as camouflage, mirror reflections of the surroundings, dazzle camouflage and mirror reflective dazzle. The Anasazi cliff dwellings in the American southwest would be an example of this strategy.

Minimal and/or transparent forms that tend to disappear in their setting. This is accomplished to some extent in Philip Johnson's glass house in Connecticut.

Transparency and reflectivity that make a building or

space difficult to read accurately. The atrium space in the Trump Tower in New York tends to do this.

Optical phenomena which may engender a degree of perceptual dissonance such as equivocal figures, "impossible" figures, visual illusions, and/or perspective distortions. The Greeks used visual illusions to correct for perceptual distortions in some of their buildings. Indeterminate form strategists might seek to do the opposite.

Form complexity (including fragmentation and irregularity) to create perceptual difficulty or lack of visual focus. Some examples of so-called "deconstructivist" architecture tend to rely heavily on this strategy.

Spatial complexity, as exemplified by the great mosque at Cordoba, which incorporates this strategy through the use of many overlapping foliated arches.

Holographics to create illusions of depth or color, and light manipulated through refraction, reflection, and projection to create visual effects that may be obscure, vague, or blurred. Some of the great Gothic cathedrals use light to great effect.

An indefinite edge which tends to blur the line between the natural and the man-made. Some of Neutra's architecture in California used glass to accomplish this, while some of the hill towns in Italy or Greece gradually lose density at the edges to "vignette" into the surroundings.

These are representative of some of the many strategies that may be consciously used to create an architecture of indeterminate forms. Because many of the indeterminate forms in nature are difficult or impossible to replicate in a built form (such as the forms of fire or water), they may be included as natural elements within architecture (such as fireplaces or pools).

### CONCLUSION

The relationship of man to an architecture of indeterminate form may parallel the relationship of man to nature. It is thought that this kind of architecture, together with the natural surroundings, will encourage those positive responses engendered in nature (and may to some degree act as a substitute for nature in highly urban settings). This kind of architecture may have the effect of alleviating some of the "inhumanity" of the predominantly man-made elements of an increasingly urban society. Although elements of indeterminate form may be present in current and past works of architecture, a deliberate and knowing application of the strategies will more effectively accomplish the ends of relating to nature and engendering the positive psychophysiological reactions described above.

Because nature is largely composed of indeterminate forms, architecture utilizing an indeterminate form vocabulary may establish a neutral continuum with the natural environment. In an age of concern for the environment and sustainability, an architecture of indeterminate form may be seen to have a less detrimental impact on our surroundings than current "strong-form" architecture.

**REFERENCES**

- Arnheim, R. (1986); *New Essays on the Psychology of Art*; University of California Press
- Balling, J. D., and J. H. Falk (1982); "Development of Visual Preference for Natural Environments"; *Environment and Behavior* 14 (pp. 5-38)
- Ehrenzweig, A. (1965); *The Psycho-Analysis of Artistic Vision and Hearing, An Introduction to a Theory of Unconscious Perception*; George Braziller
- Hildebrand, G. (1991); *The Wright Space: Pattern and Meaning in Frank Lloyd Wright's Houses*; University of Washington Press
- Kaplan, R., and S. Kaplan (1989); *The Experience of Nature*; Cambridge University Press
- Kaplan, S., R. Kaplan, and J. S. Wendt (1972); "Rated Preference and Complexity for Natural and Urban Visual Material"; *Perception and Psychophysics* 12 (pp. 354-356)
- Kellert, S. and E. Wilson (1993); *The Biophilia Hypothesis*; Island Press
- Knopf, R. C. (1987); "Behavior, Cognition, and Affect in the Natural Environment"; *Handbook of Environmental Psychology*, edited by D. Stokols and I. Altman; John Wiley
- Lumsden, C. J., and E. O. Wilson (1983); *Promethean Fire: Reflections on the Origin of Mind*; Harvard University Press
- Mednick, S. A. (1962); "The Associative Basis of the Creative Process"; *Psychological Review* 69 (pp. 220-232)
- Orians, G. H. (1980); "Habitat Selection: General Theory and Applications to Human Behavior"; *The Evolution of Human Social Behavior*, edited by J. S. Lockard; Elsevier North-Holland
- Ulrich, R. S. (1979); "Visual Landscapes and Psychological Well-Being"; *Landscape Research* 4(1), (pp. 17-23)
- Ulrich, R. S. (1983); "Aesthetic and Affective Response to Natural Environment"; *Behavior and Natural Environment*, Vol. 6, edited by I. Altman and J. F. Wohlwill; Plenum
- Wilson, E. O. (1984); *Biophilia*; Harvard University Press
- Wohlwill, J. F. (1976); "Environmental Aesthetics: The Environment as a Source of Affect"; *Human Behavior and Environment*, Vol. 1, edited by I. Altman and J. F. Wohlwill; Plenum