

A Report on Psychology & Architecture **By W. Bro. Victor G. Popow, Dec 2000. V1**

Given my long affiliation as a modern speculative Freemason, my interest in architecture and my previous study of psychology I composed a paper on the psychology of architecture. I wanted to restrict my study to artificial structures and their possible impact on human behaviour. To begin with I asked myself do humans have an innate ability to perceive patterns in artificial forms? Is the human body physically wired to 'recognize' the subtleties of patterns or proportions in art or architecture? What might these 'patterns' be? If people do indeed react to the subtleties of structure would this explain why people react emotionally or 'spiritually' given their entrance into Medieval Chartres Cathedral, France? Why would people either "like or dislike" the ultramodern gleaming new Guggenheim Museum in Bilbao, Spain? I am inclined to believe that the human body is biologically predisposed to recognizing design and structure either consciously or unconsciously and that a variety of criteria may be at work influencing us when we find ourselves living, working or playing within the urban environment.

Upon investigation I soon found that the study of psychology and architecture is a broad and diverse one including many different fields- mathematics, aesthetics, philosophy, different branches of psychology- environmental, gestalt or social, physics, and naturally, architecture to name just a few.

I began to explore the relatively new field of environmental psychology that at first I considered superficial. But upon closer examination the physical and behavioural effects between people and their physical environments became quite complex when elements of light and colour (shade or tint, warm or cool), texture (materials and surfaces), acoustical characteristics (noise) are taken into account. Ultimately, "Light is the most effective element in creating a sense of mystery and awe, and the manipulation of light is a principal agent in the creation of shrines and religious buildings."ⁱ Much has been written about the effects of colour on people as philosopher and Freemason, Johann Wolfgang von Goethe discussed optics and the physiological effects of colours in 1810. A recent study illustrates gender sensitivities to colour as females seem more 'colour conscious' and there colour tastes more "flexible and diverse."ⁱⁱ When a person is exposed to the colour red dramatic physiologic effects may be observed including the release of adrenalin, elevated heart rate, and an increase in gastric activity- hence the practical use of red or red-checked table clothes in restaurants. The application of orange and reds (warm colours) to interior's or the use of interior accents, such as candles, with low-level light output, serve to enhance an intimate psychological effect when applied to dining. Electroencephalogram and pulse rates of people recorded accelerated heart rates when in a grey room than in a colourful room (Kuller 1976). Indeed I found that environmental psychologists do concede, "our surroundings influence not only the way we think but our intellectual development."ⁱⁱⁱ Environmental psychology would surely, but not completely, confirm why people might behave in awe at the sight of the awesome vertical interior of a Medieval cathedral and perhaps the giant multicoloured stained glass windows, the varied materials and textures on the floors, walls and ceilings and finer patterned stone detailing. Given these factors one would have to take into account the physical surroundings that assail the senses in any environment. Is the environment dimly or brightly lit? Is there an optimum or minimum requirement to lighting before one is either frustrated- for example due to low light conditions? Does the environment cause a person physical stress- due air temperature (heat or cold) or perhaps noise levels? How about the building's scale? Too large a structure may make a person feel overwhelmed and vulnerable while too limiting a physical environment could be constrictive to movement to not only one person but an entire group.

Environmental psychology may also be broken into several elements: *attention* or understanding how people notice their environment; *Perception and cognitive mapping* or how people cognitively map what they experience based on what they know or think they know about their environment; *Preferred* environmental psychology studies people's motivations illustrating that people naturally seek out places where they will feel competent, confident, where they will feel comfort or enjoyment. Further, research demonstrates that people have preference for coherence (a sense that things in an environment connect together) and legibility (that people can feel they may explore an environment without being lost). Thus the creation and preservation of a preferred environment is believed to increase the sense of well-being and behavioural effectiveness in people.

Gestalt psychology, from the German *Gestalt* meaning *form* or *shape*, seeks to explore how the mind forms or interprets patterns. It is thought that the mind is 'wired' to seek meaning and significance in all the sensory information inputted into it. This may be the result of eons of development as human's instinct for survival was based upon changes in colour in the environment (to seek shelter upon lower light levels indicating the coming of night) or auditory input (the snap of a twig indicating the threat of a predator).

Proximity gestalt illustrates how people see a pattern in space despite distance. For example, the stars representing the 'big dipper' star constellation are in fact stars at different distances from the earth but they are perceived as being on a single plain. *Repetitive* gestalt demonstrates equalities in object spacing where none may exist. The corner columns of the Parthenon designed to be thicker and spaced closer to surrounding columns will be visually interpreted as being of equal size and spacing. Indeed the entire structure itself was designed with subtle curves, the columns are slightly tapered, the rectangular base is slightly curved purposefully engineered to withstand the lateral movement of the earth caused by earthquakes. *Simplest and latest figure* gestalt suggests that the mind may fill in missing portions of the simplest or largest (which also suggests prioritization) figures visually presented.

It is also noted that there is a kinesthetic body response to forms and lines. We may examine the horizontal prairie residence "falling water" designed by the great American 20th century architect Frank Lloyd Wright that may be sensed symbolically as a human body at rest horizontally suggestive of domestic tranquility. In contrast, we may sense the dynamic equilibrium of a vertical structure implying aspiration, reaching and assertiveness as in a corporate headquarters building or a Gothic cathedral.

It is also known that the mind seeks to organize data when faced with random unknown visual information or even construct data, as in the absence of sensory data when a person is placed in a sensory deprivation chamber. In circumstances where cognitive information becomes repetitive the mind filters and automatically switches to anticipating patterns (be they open spaces, windows, or decorative elements- designs, painted surfaces, textures or ornamentation). Mentally there are impulses towards continuity and closure that again, suggests the mind's preference for pattern, unity or coherence in a structure despite circumstances when these characteristics are not inherent.

The recent study of complexity and patterns (fractals) via physics has relevance to architecture. A fascinating path by way of Nikos A. Salingaros, Mathematics Professor at the University of Texas in an article entitled "Architecture, Patterns and Mathematics" theorizes that: "Man's visual system is especially receptive to patterns." In Salingaros' treatise patterns are defined as "regularity in some dimension" and that mathematics is a science of patterns. Thus I began to see how mathematics, patterns and gestalt psychology began to intertwine and be applied to architecture. The paper referred to mankind's need to "generate patterns out of some basic inner need" and applying basic psychology we might ask, are human beings insecure in a perceived wildly chaotic universe? If the answer is yes, then does architecture and design fulfill a basic desire for permanence and meaning? Might this explain the preference towards architectural details, to regular patterns and symmetrical design- in other words, does architecture fulfill man's craving for meaning? And if symmetry and patterns are preferred or considered 'beautiful' does this conversely imply that random design, empty walls, little colour, no pattern be judged as non-preferable or even 'ugly'?

Salingaros' paper relates that historically architects were mathematicians and that the two disciplines were indistinguishable. Historically, when the Emperor Justinian wanted an architect to design the church of Hagia Sophia (Divine Wisdom) in Istanbul, Turkey, a structure that would surpass anything built before, he turned to two professors of mathematics, Isidoros and Anthemios. The Medieval stonemasons had a strong understanding of Platonic philosophy, proportion and mathematics and to them all their work was grounded in the ancient Pythagorean maxim "all is number." Studying the Gothic structures geometry and mathematics are completely woven into (the Golden Mean or Golden Proportion being a consistent calculation) the structure's physical features honouring the geometric nature of creation and the Creator. Ancient Classical cultures and Western European Renaissance architect mathematicians designed their structures with patterns in mind and thus the structures themselves reflected processes which are inherent in the human mind (again we must refer to Gestalt psychology).

A recently developed model to gauge the intrinsic qualities of buildings based upon the science of thermodynamics^{iv} is another link that might be used to ask ourselves what is it that is appealing to the perception of structure? Architectural temperature (T) defines the degree of detail, harmony (H) measures coherence and symmetry. The degree to which a structure has 'life' (L) is a product of temperature and harmony. Complexity (C) also is a measurement based on T and H. The model establishes a connection between science rooted in measurement and subjective qualification. Using this model to gauge the qualities of, for example, Chartres cathedral in France, or any other medieval or modern structure, one would find high temperature (that is colour hue variations according to light levels which are richly impressed upon an individual in the structure) and high harmony (little randomness) would reflect a preferred high 'life' in a structure. The model is indicative that "the connection between biological life and architecture arises from the thermodynamics of living forms. So, life would seem to be the result of enormous and purposeful 'complication.' Biological organisms are marveously connected on many different levels, and they are characterized by very high design temperature and harmony. The connective thought processes underlying cognition themselves mimic the thermodynamic and connective structures that are characteristic of living forms. This helps to explain our instinct to relate to forms having a high degree of architectural life and thus confirmation of our proclivity for pattern.

The architectural temperature mimics the activity of life processes, which is highly organized and structured. It should not be surprising then that living beings instinctively copy the intrinsic qualities of living systems in their own creations. How can humans put an image of life into a building? Apart from figurative icons and statues, we work with emotions: structures are carefully tailored to generate positive psychological and physiological responses. Far from merely being a plausible hypothesis, this model suggests, "humans have a basic need to raise the architectural life of their environment."^v The thermodynamic model not only provides us with a quantitative methodology for gauging the quality of structure but also more importantly confirms a psychological preference between structures and people.

A study of architecture and its effects on people yields a tremendous amount of learning from very diverse subjects. It certainly became apparent that the so-called 'simple' act of experiencing structure and environments involves so many different aspects. The cognitive function alone seems fantastic itself when one considers the eyes move together at "nine hundred degrees per second bringing our gaze on a target within 25 milliseconds."^{vi} The eyes process an unbelievable volume of light frequency information along with the brain that processes what is seen or what is believed to be there and perhaps fill in the gaps for what may be missing. Gestalt psychology seems to be central to how we experience architecture in suggesting our brains are wired to infer the rhythm and patterns of architecture that in turn yield a behavioural effect. Such an understanding of behaviour and environment might be helpful in the design of isolated or otherworldly extraterrestrial environments (the International Space Station Freedom for example). It seems evident that people have a preference to generating patterns out of an innate inner need to constancy and predictability opposite the unpredictability and chaos extant in the natural universe. As to a connection between architecture and people "We apparently enjoy the input from patterns, and this enjoyment often increases with the complexity of a pattern; however, this is true only for complex patterns that have some sort of ordering. The precise nature of this effect remains imprecise and largely intuitive."^{vii}

Architecture a symbolic and intentional endeavour seems to reflect the psychology of its designers regardless of time, culture and perhaps even species. Space, form, and light are elements that are often incorporated either purposefully or unconsciously for aesthetic or practical reasons but more pointedly give creatures meaning, purpose and stability amidst an ever changing physical universe of seeming chaos.

References

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