

SPACE STATION ARCHITECTURAL ELEMENTS MODEL STUDY

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SPACE STATION HUMAN FACTORS RESEARCH REVIEW

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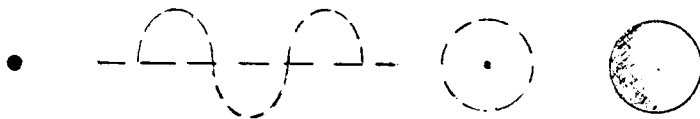
Space Station Architectural Elements Model Study

Introduction:

It is our premise that the primary issue in the creation of architecture is how the relationship of Individual and Place to architecture is understood.

There is a unity and order common in nature and in man which we continually respond to in the creation of our man-made environments. Certain proportions used again and again indicate the inter-relatedness of all things -- whether created by nature, or apparent in the most ageless creations of man. So far in the effort to create a space station suitable for human habitation the materials and hardware necessary have been developed by technological research. Now we must pay attention to the appropriate spaces which will allow us to house ourselves with dignity within the vast reaches of our universe.

The recognition of unity as the foundation to our preliminary design drawings is best expressed in the following illustration:



"Unity", the basic vibratory element of matter (a) produces an oscillatory motion which, when observed, generates a wave (b). The wave is classically the foundation of a circular form (c). A spherical body (d) is generated by the rotation of this circular form, returning one's perception to unity.

Proportional Powers:

There is a power of certain proportions analogous to musical and root harmonies that has been known since ancient times. Certain proportions create harmony and unite parts of a whole. In other words, space and form are harmonious when their internal relationships are such that a whole is created.

Space Station Architectural Elements Model Study

There are proportions, patterns and an order which will unfold when unity is used as an ordering principle. Unity has three powers in this project:

PLACE:	Position of Space Station in the Universe
ARCHITECTURAL SHELL:	The preferred diameter of the cylinder
INDIVIDUAL:	The center point in the window of the eye

Attention must be given to unity, order, and the harmony of elements which support the creation of space for the individual to dwell with meaning.

Background:

In the first stages of this project the need was seen to examine the proposition that harmonious proportions are the key element in a well-ordered and easily comprehended environment. The use of the word "proportion" here describes the manner in which shape and form and dimensions relate to the whole. Ratios describe the relationship between two or more dimensions. They, ratios, are non-dimensional numerical values representing relationships between dimensioned quantities. There is a reciprocal relationship between two unequal parts of a whole. The small part stands in the same proportion to the large part as the large part stands to the whole. The different parts of the whole are united yet each maintain their own identity while blending into a greater whole.

In reviewing the history of the existence of proportional relationships, one must consider the role of natural phenomenon in the overall sense of harmony. Natural evolutionary processes first established dimensional ratios which, when analyzed mathematically, surface the "Golden Section" as the prevalent

Space Station Architectural Elements Model Study

value found. We can also see many values in nature falling within a rather narrow band of this proportion. This phenomenon is too glaring and consistent to be ignored. Mathematically, this ratio has the value of 1.618 and can be found in crustations, plants, insects, shells, pine cones, the human face and in a myriad of other forms. Some are resolved within spiral configurations and others are found in the relationships of linear dimensions. Each is related to the growth pattern of the organism. Our proclivity to use and preference for the ratios in the range of the Golden Section then goes deeper than the fact that consciously, a given shape or form is pleasant to the eye. Our continued exposure to this proportional ratio in nature for eons has provided us with almost genetic preferences for this range of ratios.

Since very early times in history, man has used systems of proportionality, stemming from nature, as a method of installing order in his creations. Enduring man-made works can be analyzed and understood by examining their proportional systems. For centuries shaman, artisans, and architects of many civilizations have exhibited a preference for specific ratios. As examples of this order we can look at many civilizations and their specific expressions such as Stonehenge, the Parthenon, Chartres, the Garden of Ryoan.Ji, etc. which all use the Golden Section as unity. It is evident that those human creations, which we define as enduring, express a truth and a relationship to the basic pattern-forming process of nature.

Schematic Studies:

The investigation of a proportional base for the design of the habitation module establishes the diameter as "Unity". The development of geometric forms, as the support system to the shape of space, unfolds from "Unity" creating and balancing

Space Station Architectural Elements Model Study

dimensions of the module for specific user needs. Ratios for consideration were derived from figures which represent values of 1.414, 1.618, and 1.73. These values are derived from geometric figures based on $\sqrt{2}$, the Golden Section, and $\sqrt{3}$. Elements of construction based on these ratios are made and tested for balance and harmony. This is an on-going process in order that the best ratios for the design be found and that small differences in perception and harmony are resolved. For this reason, a strict numerical ratio has not been established; however, the range of values has been narrowed to that which best fits the needed pattern. There the Properties and Behavior of the Individual and the architectural shell unite to form opportunities for selection with respect to the interior arrangements of the habitation module.

Conclusion:

The Space Station, as with all architecture, must unite the Properties and Behavior of Individual and Place, using proportions from both to make whole the understanding of ourselves at this moment in evolution. Harmonious proportions in any environment are similar to the acceptance and enjoyment of the harmony of many well-tuned musical instruments. A well-tuned or well-ordered environment tends to have "invisible" proportions. They produce order but do not intrude on the perception and cognitive mapping of the environment.

Systems of proportion are not ends in themselves but are a means to select a series of "Spaces" which relate one to another in dimensionally specific terms. These internal relationships create a whole when the forms are harmonious. This harmonic relationship is of intrinsic value for individuals to be physically and psychologically in balance with their universe.

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Space Station Architectural Elements Model Study

"Whenever a human being truly dwells, he sets up a region of meaning that is charged with different levels of sensibility. A healthy environment allows the person to move through different spaces, sense their qualitative differences, and grasp a unifying pattern."¹

¹ Joseph Grange, "Radiant Lessons for the Failed Landscape of Desire:", Places 2, no. 2 (Spring 1985): 18-23.