A DESIGN SCIENCE / VISUAL MATHEMATICS STUDIO AT HARVARD-RADCLIFFE

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Buckminster Fuller's observation that it does not function well if it is not beautiful, is exemplified by apparatus which I designed to measure thermal conductivities at elevated temperatures. Subsequently, when designing materials to hold information for computer memories, I became aware of the need to develop a language capable of storing, communicating and retrieving spatial concepts and patterns. A great variety of natural and man-made crystals can be modeled by combinations and permutations of tetrahedral and octahedral modules, which 1 designed to be attractive in appearance and handling. An exhibition of these modules led to a joint effort in programmed instruction with Skinner's Behaviorist group at Harvard.

An investigation into the completeness of plane geometric and color symmetric groups yielded a set of slides exhibited at the International Crystallographic Congress in Rome A set of silkscreen prints by Holly Alderman and the author was exhibited at the first Symmetry Congress in Budapest, but was never completed. Because of new computer technologies, a new set was initiated, and partly shown at the third congress in Alexandria. This portfolio is now complete, and will be transferred to transparencies for projection at this lecture.

Following a joint exhibition with design professor Duncan Stuart, Symmetry *and Transformations* at the Carpenter Center for the Visual Arts at Harvard University, in 1972 I began to teach a Freshman Seminar on *Structure in Science and Art* and a course on *Design Science* in the Department of Visual and Environmental Studies, and as of 1995 also in the Graduate School of Education at Harvard. For the past twenty years we have developed a curriculum in which the fundamental properties of our space are explored experimentally, with an emphasis on natural structure and an avoidance of right angles, squares and cubes, which do not prevail in nature or in the art of people in close touch with nature.

Students come from a mix of backgrounds in sculpture, painting, film animation and architecture to biochemistry, computer science, mathematics and mathematics education. Their work has been exhibited extensively, notably at the University City Science Center and University of Pennsylvania in Philadelphia. The architecture of R. Buckminster Fuller and the art of

M.C.Escher are used as examples, but students are encouraged to choose their own media to work in.

In the Design Sciece Studio/Visual Mathematics Laboratory we have developed many three-dimensional models of transformations of various polyhedra into each other, as well as the portfolio of repeating designs representing all plane symmetry groups. These will be shown, together with representative student work of the past twenty five years.