DEFINING BASIC DESIGN AS A DISCIPLINE

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***Abstract**: Johannes Itten's original Bauhaus Vorkurs took from the great movements of Cubism, Constructivism, and Expressionism, all developed by the end of the second decade of the 20th century, creating thereby an introductory medley of Modern Art. Josef Albers revolutionized Basic Design by purging it of unrestrained expressionism and established it as a full-fledged discipline that deals only with universal and persistent, non-objective formal elements of the visual world. At the Hochschule für Gestaltung, Tomás Maldonado retained the Albers model of strict non-objectivity and linked it interdisciplinarily to abstract fields of knowledge, among which are symmetry theory, topology, and Gestalt principles. In the discipline of basic design, the opportunities for self-determined, non-applied research are copious.*

1 BACKGROUND AND BASIS

Johannes Itten's original Bauhaus *Vorkurs* borrowed from the great movements of Cubism, Constructivism, and Expressionism, all of which had been fully developed by the end of the second decade of the 20^{th} Century—that is, by the time the Bauhaus opened in 1919. In his *Vorkurs*, Itten created, consequently, a sort of introductory mélange of Modern Art. Josef Albers revolutionized the *Vorkurs* at the Bauhaus by purging it of unrestrained expressionism and established it as a full-fledged discipline that deals only with persistent and universal, non-objective, formal elements that inhabit the visual world.

With the closing of the Bauhaus, Albers took his strict regimen of non-objective design studies to Black Mountain, N.C. The teaching of color in any manner had been reserved at the Bauhaus for Albers's elders, particularly Kandinsky and Klee; so it was at Black Mountain that Albers developed the most notable of his several basic design topics, based not on the theory of color (the teaching of which he depreciated), but on the perception of color. That study culminated at Yale with his ambitious book, *The Interaction of Color*. At the Hochschule für Gestaltung, where Albers had twice served as a guest teacher, his model of strict non-objectivity was retained, first, by Max Bill, a Bauhaus student of Albers, and subsequently by one of a group of Argentinean vanguards of *art concret*, Tomás Maldonado. Maldonado went one step further; he linked non-objective design *interdisciplinarily* to *abstract* fields of knowledge—among which were symmetry theory, topology, and Gestalt principles.

Laying this down as a background, I claim that basic design is a discipline unto itself—so long as it deals only with non-objectivity. As a complete domain—perhaps, a strange domain—it is one that is all-empowered, self-contained, and possessed of all the prerogatives of sovereign sway. Another way of putting it, non-objective basic design does not involve issues that are specific to any of the disciplines of applied design: architecture, graphic design, or product design, and allied fields. I will not take the time to make that argument here. Permit me, at the same time, to introduce a consummate statement, regarding this point. It comes neither from Albers nor Maldonado, but from Iakov Chernikov of the Vhuetmus school of design of Moscow, a design school that predated the Bauhaus:

Specific functions or subject matter as such, do not play any part in this course of teaching. Not once do we use real briefs and problems. The whole methodology is based upon the development of "combinations" and "assemblages" of lines, planes and volumes, independent of what the given elements may represent. Just as an appropriate assembly of sounds gives us musical products, so too we construct and assemble a representation in which lines, planes and volumes can be musically turned. Thus we create a skilled composer of new forms.

The interesting result of this non-objective approach is that we produce an executant who is freely capable of handling tasks that are based on real subject matter, for the non-objective and real are erected upon identical principles of form.[1]

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[1] Catharine Cooke, *Iakov Chernikov: AD Profile*, vol. 55, IC, 22.

Taking another cue from the wntings of Albers ("the discrepancy between physical fact and psychic effect"[2]), my basic design studio (which I had recently preferred to call a "formative design studio"—though I now think it should be called a "non-objective design studio") dealt principally with two issues: how structure *actually is* and how structure *is perceived*. By ***structure***, I mean elements (or parts) of a design and how they are related or (arranged) in a design. In regard to the visual manifestations of design, the *elements* are basically *shape* and *color*; and to *arrange* such elements is *to design*. When concentrating on the actual nature of structure, its perception was always brought into consideration; and it was the other way around when concentrating on the perception of structure.

2.1 ACADEMIC RESEARCH

Working on non-applied research has the disadvantage that there is not much internal institutional funding and, often, even less external funding; and deans do not regard unfunded research to be of much importance. The flipside is that researching formal issues very often requires little or no funding; and it affords, therefore, relative freedom for the researcher to do exactly what he chooses to do—that includes not having to meet arbitrary deadlines. In my case, at least, it seems that *research found me*, perhaps haphazardly, but welcomely. My deep-rooted curiosity, companioned with a certain facility of observation and a decided visual orientation, had something to do with that, to be sure.

When I studied at Yale, just about every one of my design critics practiced: Eliot Noyes, Philip Johnson, Louis Kahn, Paul Schweikher, Edward Stone, and Richard Neutra, among others. Frederick Kiessler practiced very little; rather, he sculpted and exhibited eccentric architectural projects. Two of my critics were in-house faculty, who did not have practices, even if they received an occasional commission; and they handled most of the perfunctory activities around the school to make up for that deficiency. At the same time, the curriculum in those days was put out by the department's chairman, who took counsel with his faculty rather sparely.

When I began teaching in a school of architecture, research was still not a requirement for a sideline career of critiquing design students; the mode still was to have a practice. Then, non-practicing graduates of schools of architecture filtered into the academy; and they began to justify their fulltime faculty positions through research. Thus, I entered teaching at the cusp between design critics who were practitioners and design critics who were research academician.

[2] Josef Albers, *Search Versus Re-Search*, (Hartford, Conn.: Trinity College Press, 1969), 10.

I was, in fact, doing architectural work on my own at the beginning of my teaching career; and I was one of the first (July 1965) to be awarded an Arts and Humanities Program (then NEH) grant, which led to the series of booklets, *Symmetry: an appreciation of its presence in man's consciousness*. The project's justification, however, did not hang on its own merits as an artifact of abstract knowledge; instead, it was framed as "a tool for design education," as indicated by the title of my proposal, "Issues of Symmetry in Design Education." I had been introduced to the topic of symmetry by Tomás Maldonado at the Hochschule für Gestaltung (HfG), mainly through the text of K. L. Wolf and Robert Wolff; and it is my recollection that Maldonado had encouraged me to develop such a study—with one intention being the inclusion of other members of the HfG family.

Excepting for a small supplemental grant on the same project, this was the only research funding that I ever received. I might add, this was the only research project on which I ever had to meet deadlines; and an absence of deadlines has allowed projects to mellow—to improve with age. Since, then, a large part of my research, but not all by far, has come out of the classroom.

2.2 RESEARCH IN THE BASIC DESIGN STUDIO

To conduct research deliberately in the undergraduate classroom can dilute and abuse pedagogic purposes. Students should not be shortchanged for the sake of research. The fact is, however, research topics can just turn up in the design studio (the design studio being a rather different environment from the typical academic classroom) in many an unpredictable instance and does so, almost inevitably, as a byproduct—when the curriculum itself is solid and forward-looking. A large part of the studio way is the facilitating of the student's inventiveness. But the student is often not equipped to judge what is truly inventive, in respect, for instance, to solutions that other students had already hit on. It takes the discerning eye and seasoned experience of the instructor to catch what is really new and significant. Furthermore, the grist for research can occur when the experiences of previous studios are built into subsequent ones. Unforeseen solutions often create unforeseen questions.

Without a doubt, I can make the case that my students were never deprived—even while material that was destined for research was ensuing from my assignments—unawares to myself, often, at the time of its occurrence. My objective with my students was mainly to train them to become proficient and self-sufficient in aesthetic judgment; their inventions—innovations, which would not have happened without the context of their instructor's studio task—were more of a dividend than a demand. (I should make clear that the identities and contributions of individual students have been scrupulously acknowledged in all publications that have included their work—so long as editors honored my watch over that.)

In my design studio I assigned two types of tasks: the exercise and the project. Exercises tested the students' acquisition of new information, attuned them to the basic formal issues of design, trained them experientially in perceptual acuity, and implemented them with the called for skills of presentation. Exercises are precisely prescribed. At the same time, their drill tends to have a timelessness that works across the ages.

Projects challenged students to the extents of their inherent and newly acquired formal abilities, having been awakened, it was hoped, by the exercises, and educed their ingenuities. Projects allow great latitude within the framework of a challenging geometrical proposition or perceptual ambiguity. Though their topical particulars become dated, they make openings for creativity.

Exercises, it is submitted, are to design what scales and etudes are to music; projects are preludes to composing.

3 FOUR THREE-DIMENSIONAL PROJECTS

Periodically, I offered basic designs studios that were conducted in a three-dimensional format, rather than in a more usual two-dimensional one. The topics are ones that have only three-dimensional physicalities. Both types of studios covered the same general formal issues of design. Four of the three-dimensional projects that I developed are presented here; many remarkable results have come out of them.

1. The *Twofold Mirror-Rotation* Project [Fig. 1] came out of my one funded project, "Issues of Symmetry in Design Education." A grasp of the concept of mirror-rotation, even in its simplest *twofold* form, was made difficult by K. L. Wolf's German text—a text that Germans found difficult to penetrate. This intriguing type of symmetry, initially baffling me, led to its exploration and exploitation in the design studio. If its properties took inordinate time for our research team to learn, how many others in our midst still do not know what it is? The basic design studio seemed to be a good place to make demonstrative, didactic models of twofold mirror-rotation, as well as to try to bring out some of its aesthetic potential.

Of a sudden, while trying to find a good way to explain mirror-rotation to others, I realized that I had a simple didactic example of this symmetry operation in my own two hands—literally: I mirror my hands (like Dürer's "Praying Hands")—then, I rotate one hand in respect to the other by 180°—now, I have 2-fold mirror-rotation. This is what Wolf called a "coupled coverage operation"—simultaneously mirroring while rotating, or simultaneously rotating while mirroring.

See: <http://members.tripod.com/vismath/exbud/bud1.htm>

2. The *Fourfold Mirror-Rotation* Project [Fig. 2] came to light while I was familiarizing myself with crystallography. At the beginning of the funded project, no texts, which I had referenced, made clear that symmetry theory—that is, a whole system of symmetry—came from crystallography, or that molecular chemistry was decades behind crystallography—mainly because the nature of the molecule was not well understood at the time that the 32 *finite* Crystal Classes had been established.

It was from papers of Federov, translated into English through David Harker, that I had learned about famed Auguste Bravais's missing a thirty-second Crystal Class: the symmetry of fourfold mirror-rotation. For well over a century, the discovery of that class had been attributed to Hessel—and, in fact, he is the one to whom all the other early crystallographers referred. It was relatively recently, in 1986 (only three years before the organizing meeting of ISIS-Symmetry in Budapest), that it became widely known about one Moritz Ludwig Frankenheim who, in 1826, had preceded Hessel's publishing all 32 Classes in 1830—and Frankenheim had done it in a brilliantly simpler way than Hessel, through combinatorics.[3]

While materializations of this symmetry type exist in some numbers at the molecular level, fourfold mirror-rotation is rare at human scale. It is known in crystals; but no man-made artifact is known to employ it, at least not known to me. Though some students in earlier studios produced a few objects with this property of symmetry, in 1986, when I taught some sixty beginning design students at the University of Hong Kong, the majority of them made fourfold mirror-rotation objects, though some made sixfold ones. May I claim that never in the history of the world were there so many differently designed and produced fourfold mirror-rotation artifacts in one place at one time?

3. The Project of the *Trisection of the Cube into Congruent Parts* [Fig. 3] has its own odd history. Already exploring for a decade the sectioning of the cube into any number of congruent parts—and the congruent sectioning of other regular and semi-regular solids, I concentrated on the *trisectioning of the cube* with my students, after Martin Gardner had faltered in his presentation of this particular topic in his September 1980 column, "Mathematical Games," for *Scientific American*.

Since then, I have found a number of noticeably different types of trisections. Though I can surmise, not being a topologist, I cannot be certain which trisection types are unique in respect to others (there are a minimum of three, I believe) and which types are only variations of others

[3] J. J. Burckhardt, *Die Symmetrie der Kristalle*, (Basel: Birkhäuser Verlag, 1988), 34-47.

4. The Project of the *Non-orientable Surface* [Fig. 4]. Max Bill had come to the HfG with a history of sculpting the Möbius band, more generically called the non-orientable surface. Bill produced such a band for the Breuer-Roth Doldertal Apartments in Zurich, but he did not know about the nature of its peculiar topological properties until a mathematician informed him. It was Maldonado, however, who introduced the topic to his *Grundlehre* classes at the HfG. When I continued studies of non-orientable surfaces in my own studio, our first question of the Möbius band was whether any properties of symmetry could be introduced into such a type; for upon the casual viewing of its usual depiction, it appears to be irregular. Being a topological entity, the Möbius has no fixed cross-ratio and is, therefore, subject to infinite deformation (as Bill's original sculpture serves to demonstrate); however, in its usual presentation, a special case to be sure, it conforms to twofold rotational symmetry; thus, this property of symmetry can be imposed at will on such an artifact. One student demonstrated that, by starting with a flat pattern of a fourfold rotational nature, she could easily attain fourfold mirror-rotation in her configuring that pattern into a duplex non-orientable object

Fig. 1. Twofold Mirror-Rotation Artifact;
Basic Design Studio of William S. Huff;
Student: Lisa Lu, SUNY at Buffalo, 1980.

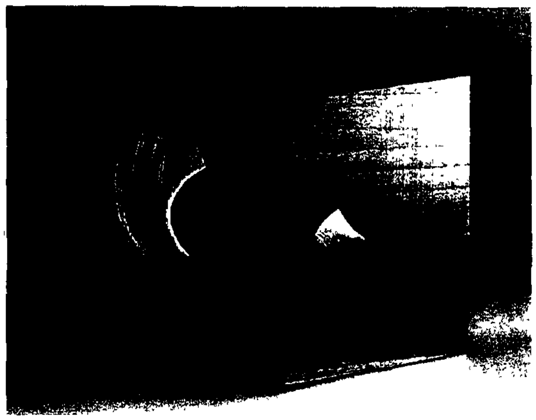

Fig. 2. Fourfold Mirror-Rotation Artifact;
Basic Design Studio of William S. Huff;
Student: Sally Kilmer: SUNY at Buffalo, 1990.

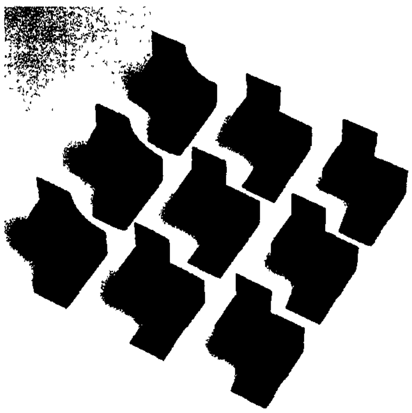

Fig. 3. Array of Three Trisected Cubes;
Basic Design Studio of William S. Huff;
rows from right to left:
Student: Vincent Marlowe, SUNY at Buffalo, 1978;
Student: Fernando Polletta, SUNY at Buffalo, 1983;
Student: Michael Cooke, SUNY at Buffalo, 1987.

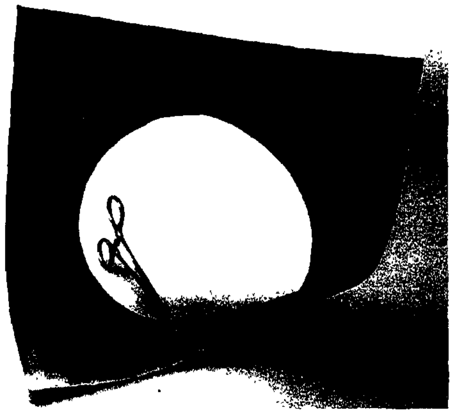

Fig. 4. Non-orientable Surface (with surgical clamp);
Basic Design Studio of William S. Huff;
Student: Habib Khalafi, SUNY at Buffalo, 1980.