Art Concret, Basic Design and meta-design

Marcel Herbst

Abstract

This note links Concrete Art (*l'art concret*), a visual art form originating around 1925, with Basic Design as taught in first-year design courses. It extends this view by approaching the topic from a rule-based, meta-design perspective using METAPOST and Nicola Vitacolonna's engine for TeXShop.

1 Introduction

Art academies of the 19th century had their introductory courses. The Bauhaus (1919–33), the famous design school located first in Weimar, then in Dessau, and eventually in Berlin when the Nazis forced it to close in 1933, introduced a first year introductory course that was to serve as a model for other design schools. This introductory course, the *Vorkurs* or *Grundlehre*, was emulated by schools around the globe in an attempt to initiate students to the basics — the fundamental principles — of design.

In post-World-War-II Germany, the idea came up to found anew a Bauhaus. The plan was formulated by (among others) Inge Scholl, the sister of Hans and Sophie Scholl; Hans and Sophie were, as members of the resistance group *Weiße Rose*, executed by the Nazis. Inge and her husband-to-be, Otl Aicher, a graphic designer, were involved in the post-war *Ulmer Volkshochschule* (Ulm Adult Education Center), and they initially pursued the notion to found a school in Ulm that was to focus on political education. When Max Bill (architect, designer and artist — and former student of the Bauhaus) was invited to join the planning team, the idea took hold to found a "new" Bauhaus. John McCloy, the U.S. High Commissioner in Germany at the time, supported the project, and eventually the *Hochschule für Gestaltung* (HfG) in Ulm opened its doors in 1953 (to be shut, in 1968, by a regressive government) [10].

The HfG had, like the Bauhaus, a formative, propædeutic year designed to initiate students to various design professions (product design, architecture, graphic design, et cetera). Part of the curriculum of this first year was a "basic design" studio, and Max Bill, the first rector of the HfG and an early advocate of Concrete Art, recruited various people of similar orientation to teach this course: Josef Albers (a Bauhaus émigré, former rector of Black Mountain College in Asheville, NC, and, after 1950, faculty member of Yale University and chair of its Department of Design — and, presumably, the person who had coined the term "basic design"),

Otl Aicher (subsequently the corporate identity designer of Lufthansa and the Munich Olympic Games), Friedrich Vordemberge-Gildewart, Johannes Itten, Hermann von Baravalle, Tómas Maldonado, and others. One who enrolled in this studio course was William S. Huff, an American architecture student and, later on, an associate of Louis Kahn who went to Germany on a Fulbright grant to attend the HfG for the 1956/57 academic year. The course which Huff took was taught by Maldonado and, upon returning to the U.S., Huff proceeded to teach this course (even part-time at the HfG during the period of 1962–66) until his retirement (mainly as a member of the architecture faculty of the Carnegie Institute of Technology/Carnegie Mellon University [1960–72] and the State University of New York at Buffalo [1974–98]).

As a student of the HfG myself (1958–62), I had heard of Huff, and had seen some of the works of his students, but I had never met him in Ulm. I came to realize the significance of Huff's work later on, when I read Douglas Hofstadter's essay on Huff [7]. Around 2009 I learned that Huff had handed over the various designs of his students to the archive of HfG, and in the winter of 2013/14 the Ulm Museum curated a show based on his legacy: *Basic Design — Von Ulm in die USA und zurück*. Perhaps two years earlier I had established mail contact, and in 2015 I visited William Huff in Pittsburgh, where he lives.

Huff creatively extended the foci of Basic Design as taught in Ulm, and he implicitly shifted the limiting æsthetic boundaries of Concrete Art. Basic Design, as seen by Huff, has a strong rule-based orientation, and because of this feature it may be approached via meta-design [4] and can be programmed. Huff's students did not use the computer to create their designs, but I found this feature attractive and, hence, started to program designs (using METAPOST, and with the help of our son, Joshua Aaron) which we had been playing with as students, or patterns Huff's students had come up with.

2 Concrete Art and Basic Design

Concrete Art evolved as an offshoot of several versions of abstract art such as Constuctivism (with Kasimir Malevitch or El Lissitzky as exponents) and De Stijl (with Theo van Doesburg, Piet Mondrian or Georges Vantongerloo as members). A first manifesto of De Stijl, dating from 1918, lists nine points, none of which bear a direct relation to stylistic elements of design: it is more a call for participation and a statement regarding social conditions.

Concrete Art, on the other hand, with its intersection of membership, is more specific than the

manifesto of De Stijl. The term *art concret* is said to have been coined by Theo van Doesburg, and in a new manifesto, published 1930 [1], six principles were emphasized, four of which (namely the second to the fifth) have direct bearing on the style (and on the particular approach):

- the art work has to be completely pre-conceived (*L'œvre d'art doit être entièrement conçue et formée avant son exécution*);
- the art work must be constructed with elements which only represent themselves ([...] doit être [...] construit avec des éléments purement plastiques [...] Un élément pictural [et le tableau] n'a pas d'autre signification que 'lui-même');
- the picture and its elements ought to be simple;
- the technical execution [of the picture] ought to be exact, anti-impressionistic.

This manifesto is, implicitly, a rejection of abstraction (as practiced, for instance, by Piet Mondrian). It is to be seen in the context of a new focus on machines and technology, shared by a range of artistic movements (including Futurism), and in relation to a culture which embraced architecture, product design, graphic design, typography, and art, in the sense of a *Gesamtkunstwerk* (synthesis of the arts). This *Neue Sachlichkeit* (new objectivity, new simplicity, functionalism), part also of the Bauhaus, was not restricted only to the visual art and design but affected philosophy as well [5].

After 1933, Concrete Art gained momentum where it could (with people like Hans Arp, Sophie Tæuber-Arp, Friedrich Vordemberge-Gildewart, Richard Paul Lohse, Max Bill, Verena Lœwensberg). Many of the works of these artists are not conceived to follow rules, but some are, particularly those of Lohse and Bill, and the ones that are rule-based can be programmed; even those that do not follow specific rules may be "recreated" (or simulated) using random variables.

Many of the rule-based works created by concrete artists are also problem-based and, hence, can easily be used in the context of assignments in a Basic Design course. The advantage of programmed design is obvious: in the old days, students were given at least one month to come up with a particular design; today, program generation can proceed much faster, and the designer (programmer) can play with parameters which may produce unexpected — unforeseen — results which cannot easily be pre-visualized. In this way, one can work like Jackson Pollock (an exponent of abstract expressionism), that is, interactively. Pollock let paint drip onto the canvas to inspect the intermediate result, and proceeded this way until he was satisfied with the result. In similar fashion, the programmer-designer can interactively play with his program by adjusting parameters, until the design is satisfactory. Because turn-around times of design production become greatly reduced, as we all know (and as font designers working with METAFONT know), design itself, and the didactic approach to design education, can be seen in a new light.

Lastly, I should also mention that Basic Design, approached from a meta-design angle, is not simply computer generated art. Computer generated art (making use, for instance, of fractals) normally lacks the historical link that I have sketched above: it does not follow the ascetic æsthetic of Concrete Art, it is frequently rather baroque (or even tacky) in appearance, and often lacks the implicit link to applications (such as architecture or design).

3   Meta-design

Meta-design, so natural to TEXnicians or users of TEX-related programs, is not frequently used in art or design schools (speculation on why this is the case would require another note). But meta-design was somehow anticipated at the HfG in Ulm, in that topics of operations research were part of the general curriculum (taught by Horst Rittel who subsequently moved to Berkeley). We were introduced to graph theory on the basis of Dénes König [9], and later I acquired the text of Claude Berge [2]. I became conscious of the four-color problem, of the problem on subdivision of a square with squares (of unequal size), and the famous problem of Königsberg which Leonhard Euler had formulated. For architecture students, graph theory was seen as a natural ally because geographic maps or floor plans could be translated, uniquely, into graphs; but the converse, so important in practical applications, was not that easy to find — that is, given a graph (of some relations), how to produce an associated floor plan.

Meta-design of Basic Design patterns, as I mentioned in the Introduction, is a new avocation of mine, spawned by old age (e.g. instead of solving crossword puzzles). I am a lover of Concrete Art, charmed by its frugal æsthetic, and I was taken aback by its seeming stagnation during the past half century. When I realized, after being exposed to Huff's design on the basis of the note written by Hofstadter, that there is a lot of life left in Concrete Art, and after I had decided to use METAPOST to again occupy myself with Basic Design, I spent occasional sessions on this theme, along with my usual work in the field of higher education management (or the writing of essays on cultural matters).

Donald Knuth's book on METAFONT [8] I have had on my shelves for some time, but I cannot claim to have studied it: I had no reason, no motive, to absorb it and was concerned with other tasks. However, I had bought and perused the tome because I wanted to know what it is about. I also acquired, early on, a technical report by Neenie Billawala [3] where she introduces her Pandora font and demonstrates visually the inherent power of METAFONT to generate variations (of fonts or patterns).

Basic Design, in its meta-design version, could not only be used in the propædeutic courses of design schools; it could also be used in high schools (in a cross-disciplinary way spanning mathematics/programming and art education).

4   Examples of Concrete Art

A few examples of Concrete Art should be introduced here to show the uninitiated what Concrete Art is about (and then I shall proceed to examples of Basic Design); I will show three designs. The first is a rendition of Max Bill that he composed for an exhibition poster (Fig. 1). It shows the ingredients of the classic Concrete Art: simple shapes, and basic colors. The second is a composition of Richard Paul Lohse, using rotation and progression as design principles (shown in black and white here; see Fig. 2). And the third is a special one, by Josef Albers, a commentary on perspective and architectural isometric drawings (Fig. 3). Albers had this one engraved in black Formica in the wood shop of the *Hochschule für Gestaltung* that was run by Paul Hildinger, and it is now in the possession of Hildinger's son Peter. There are a range of such engravings on the market.
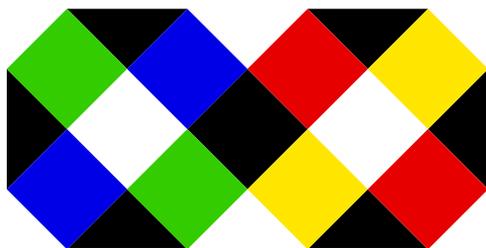
Figure 1: Max Bill, composition for a poster (1967)

5   Examples of Basic Design

Basic Design, because of its didactic focus and because it is (generally) rule-based, is naturally more structured than Concrete Art. Its focus suggests that Basic Design starts out with "assignments" and deals with various problems that affect perception, i.e. visual comprehension: foreground-background, color equivalences, moiré, symmetry (various), repetitions,
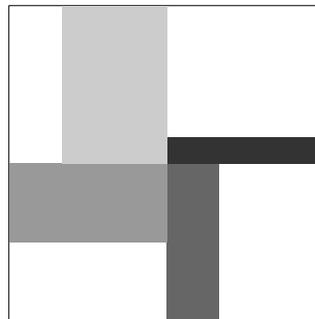
Figure 2: Richard Paul Lohse, "Bewegungen um ein Zentrum" (1982)
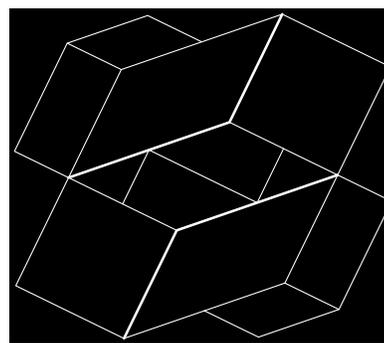
Figure 3: Josef Albers, "Structural Constellation" (circa 1955)

rotations, transformations, et cetera, or combinations thereof.

One of the first patterns that I had created was a simple dot pattern (Fig. 4). The code is the following:

```
beginfig(1)
picture dotimage;
dotimage := image(
u:=15pt;
for i=1 upto 18:
 for j=1 upto 12:
pickup pencircle scaled ((-1**(i+j))+1);
draw fullcircle scaled (0.8*u) shifted
((i*u)+((-1**j)),(j*u)+((-1**i)));
draw fullcircle scaled (0.8*u) shifted
((i*u)+((-1**j)),(j*u)+((-1**i)));
 endfor;
endfor;
);
draw dotimage scaled 1;
endfig;
end
```

On the basis of that first dot pattern I created others (e.g. Fig. 5).

I'll now show a few patterns which were created during the various design studios of Basic Design,
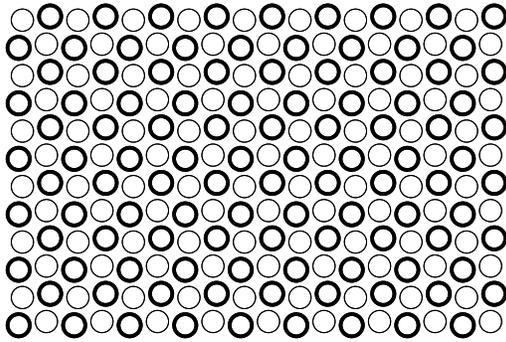
Figure 4: Simple dot pattern
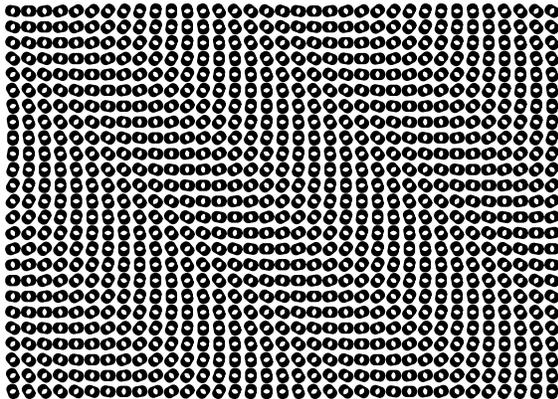
Figure 5: Dot pattern
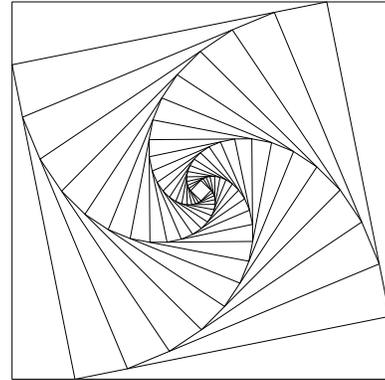
Figure 6: Transformation
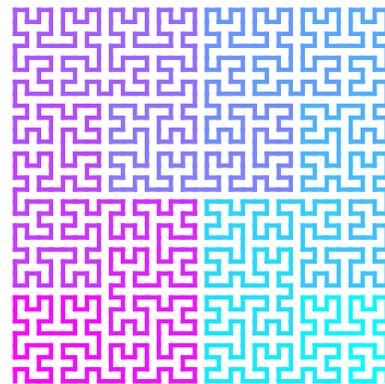
Figure 7: Hilbert curve (programmed by [6], with the exception of the color gradient)

e.g. the well-known spiral depicted in Fig. 6; or one of the mathematical curves that Tómas Maldonado (at the HfG) loved to use in his assignments (see Fig. 7 — I show it here in a color version). From Huff's studio I present two drawings: a refined simple design of two linked squares (Fig. 8), and one of the transformations which Hofstadter had liked so much (Fig. 9) and which prompted me to remark as above, after seeing these designs, "that there is a lot of life left in Concrete Art".

Finally, I shall include a random pattern designed to emulate the designs of Hans Arp (Fig. 10). The code for that picture is the following:

```
beginfig(1);
picture dotimage;
dotimage := image(
u:=24pt;
pair p,q,r,s,a,b,c,d;
  for i = 1 upto 1:
   p := (uniformdeviate 200,
    uniformdeviate -200);
    q := (uniformdeviate 200,
     uniformdeviate -200);
     r := (uniformdeviate 200,
      uniformdeviate -200);
     s := (uniformdeviate 200,
      uniformdeviate -200);
    a := (uniformdeviate 300,
     uniformdeviate 300);
     b := (uniformdeviate 300,
      uniformdeviate 300);
      c := (uniformdeviate 300,
       uniformdeviate 300);
       d := (uniformdeviate 300,
        uniformdeviate 300);
fill p..q..r..s..cycle withpen pencircle;
fill a..b..c..d..cycle withpen pencircle;
draw a..q..c..s..cycle withpen pencircle;
endfor;
);
draw dotimage scaled 1;
endfig;
end
```
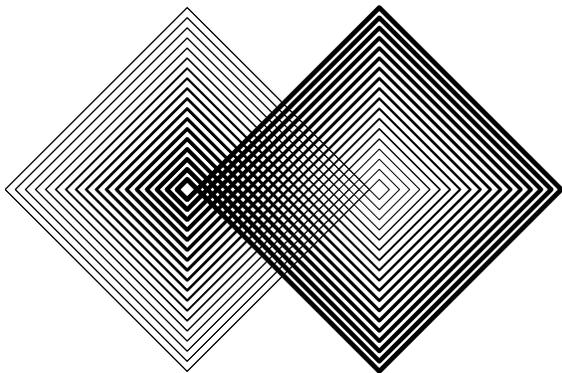
Figure 8: Linked squares
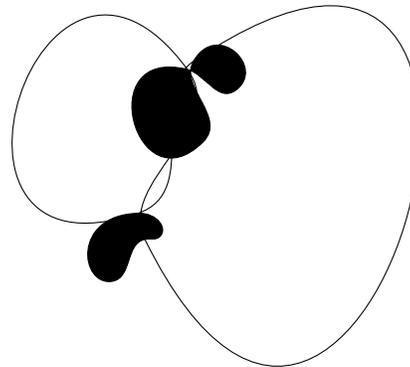
Figure 10: After Hans Arp
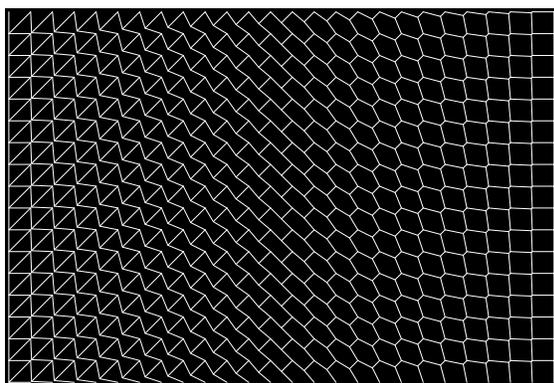
Figure 9: Transformation

References

[1] Art Concret. Numéro d'introduction. Paris,
    April 1930.
    https://monoskop.org/Art_concret

[2] Claude Berge. *Théorie des graphes et des
    applications*. Dunod, 1958.

[3] Neenie Billawala. Metamarks: Preliminary
    studies for a Pandora's Box of Shapes.
    Technical Report STAN-CS-89-1256,
    Computer Science Department, Stanford
    University, 1989.

[4] Frederick P. Brooks. *The Design of
    Design: Essay from a Computer Scientist*.
    Addison-Wesley, 2010.

[5] Rudolf Carnap. Die Überwindung der
    Metaphysik durch logische Analyse.
    Erkenntnis, 2:219–241, 1931.

[6] J.G. Griffiths. Table-driven algorithms
    for generating space-filling curves.
    Computer-Aided Design, 17(1):37–41,
    January-February 1985.

[7] Douglas R. Hofstadter. Parquet Deformations:
    A Subtle, Intricate Art Form. In
    *Metamathematical Themas: Questing
    for the Essence of Mind and Pattern*,
    chapter 10, pages 191–212. Basic Books, 1985.

[8] Donald E. Knuth. *The METAFONTbook*,
    volume C of *Computers & Typesetting*.
    Addison-Wesley, 1986.

[9] Dénes König. *Theorie der endlichen und
    unendlichen Graphen: kombinatorische
    Topologie der Streckenkomplexe*. Chelsea
    Publishing Company, 1950.

[10] René Spitz. *The Ulm School of Design: A View
    Behind the Foreground*. Axel Menges, 2002.

⋄ Marcel Herbst
  Ostbühlstrasse 55
  CH-8038 Zürich
  Switzerland
  herbst (at) 4mat dot ch