

A color revolution?
(For ARTFORUM NY)

We have, of course, quite a number of color theories, and of techniques which apply them. But the surprising thing is that we do not seem to have any satisfactory theory concerning the cultural role of colors. No doubt: the symbolic standing of various colors in different cultures has been the subject of disciplines like ethnology, anthropology and psychology, and the results of these studies have been applied by people in publicity, marketing and in architecture and in the design of industrial products, (to give just a few examples). But we do not seem to have any meaningful theoretical answers to questions of the following order: Is there, or is there not, an underlying pattern to the periodical changes in the coloring of our cultural landscape? For instance: why is it that the classical Greek town seems to have been so colorful, and the Hellenistic one so devoid of color? Or: what is the explanation for the grayness of 19th century cities, (coal?, money?, printed matter?), and can impressionism be understood as a revolt against this? Or again: why are capitalistic societies so much more colorful than are the "people's democracies", even in originally colorful places like China or Cuba? Such a lack of of cultural color theories can no longer be tolerated for the following reason:

Any cultural theory of color must consider the colors as elements of codes which carry informations. For instance: in the traffic code, "red" means "stop", and "green" means "go", and this is a universally valid convention. Now the problem of codification, (of conventionally assigning meanings to certain phenomena, and of ordering those meanings according to rules), has become central in the present situation. So far, codes have been used to carry informations from person to person. For instance: certain air waves have been codified to constitute the code of spoken language, and certain drawings have been codified to constitute the code of writing. But now, codes are needed to carry information from person to machine like a computer or a robot. The digital code is an example. The problem is that such machine codes must be very clear and distinct, because machines are not supposed to decipher "hidden" meanings, (like in a poem or a surrealist painting). This problem of the clarity and distinction of codes which mediate between humans and machines beats back upon the codes which mediate between humans. Is it possible and desirable to establish clear and distinct intersubjective codes, for instance color codes that would be as clear as the color code of traffic? Is it possible to establish a color code that could become a sort of clear and distinct universal Esperanto? ^{Our} That would complement or even substitute spoken and written language? Before considering this question a few introductory remarks are in order:

One may distinguish between two extreme types of code structure: "denotation" and "connotation". In "denotation", each element of the code means a single element of the universe of meaning, and each element of that universe is represented by a single element of the code, (a single symbol). Such a code is said to be "bi-univocally" related to its universe of meaning. In "connotation" each element of the code may mean several elements of the universe of meaning, and each element

of that universe may be represented by several symbols. Such a code is said to be "equivocally" related to its universe of meaning. Colors have so far been used equivocally, except for a few recent instances like the traffic code or on price labels. Denotative codes have the advantage that their meaning is clear, and this is why they are used in scientific communications, (like the code of numbers or the code of symbolic logic). But they have the disadvantage that their meaning is "poor" because there are intervals between their symbols, (for instance between "1" and "2" and that most of the universe of meaning escapes through those intervals which gape there. Connotative codes have the advantage that their meaning is "rich", because the vectors of meaning cross and overlap, and this is why they are used in artistic communications, (like the code of colors). But they have the disadvantage that the meaning is muddled, (demands interpretation). The problem is: can a code be made that is both clear and "rich", and can colors be used to attempt this? In other words: can a color code, (or several color codes), be established which may serve both for scientific and artistic communications, thus doing away with the fateful divorce between scientific and "humanistic" culture? If stated thus, the problem shows its revolutionary impact. Such a color code, (if at all feasible,) would radically transform our cultural situation, and it would affect not only our thinking and feeling, but even our perception of the world. It would affect our "aestheton", it would be an aesthetic revolution.

Let me attack this problem from two different angles. The one has to do with the "poverty" of denotating codes, of "clear and distinct perception". The scientific angle of the problem was posed by Descartes: "how can the clear and distinct structure of mathematical thought become adequate to the concrete compactness of the objective world? How can the "thinking thing", (res cogitans), become adequate to the "extended thing", (res extensa)?" His answer was: "thanks to analytical geometry", which to him was the only method to gain scientific knowledge. This method was improved by Leibniz and Newton, who invented the calculus which was meant to stop the intervals between the numbers, by "integrating the differentials". Thus a code was established which was both clear and "rich", and it was believed that thanks to it the world has become accessible to knowledge. Our optimistic grandfathers believed in "progress", because everything has now become codifiable in differential equations, (this is the true basis for 19th century optimism). However, the optimism did not last long, because to apply such equations, (to use them to solve problems), it is necessary to re-numerize them, and this is a very tedious and lengthy task, (it may take longer than is the human life span). This is why computers were invented: to "calculate" equations. And this is the true reason for our pessimism as far as "progress" is concerned: even with computer speed we cannot hope to live long enough to solve the problems.

The other angle has to do with the curious fact that our thinking is mostly verbal. The problem which Descartes tried to solve is one of adequating fundamentally verbal thought, ("concepts"), to the world. This is so because he thought of the "thinking thing" as of a "speaking thing", a thing which uses the alphanumeric code to articulate itself. It never occurred to him that one may

think non-verbally, for instance in colors. Of course, it is easy to explain why our thinking is mostly verbal. Our body has organs which permit us to easily codify air waves into phonemes, speaking comes "naturally" to us. (Although it is an open question whether speech is a "natural" faculty of our species, or whether it is a "cultural" factor.) There are other species which have organs that permit the codification of colors. Some cephalopods, for instance, may change the color of their skin, producing various spots of different colors, they can control each spot with their central nervous system, and there is no doubt that they use this faculty for inter-specific communication. They dispose of a color language. But we can do the same, and indeed we have done so at least ever since Lascaux, ever since we began painting on cave walls. We are perfectly capable of thinking in colors. We are perfectly capable of thinking by a non-verbal, (illogical), method. Unfortunately, our color codes have so far been mostly connotating, and therefore almost useless for scientific knowledge. If we were to establish more denotating color codes, would Descarte's problem of adequating the thinking thing to the extended thing be the same, or would it be quite different? What sort of knowledge would a color thinking result in? And is this a justification for a re-newed optimism?

Let me now propose an obvious example for this possible optimism. A fractal equation is fed into a computer, where it is transcoded into digitals, and then "numerized" and computed in the form of curves and surfaces on the screen. Those shapes may be colored: the computer disposes of a palette which permits almost infinite variations. The question here is how to adequate the colors to the shapes, which is to say: how to transcode numbers into colors. It is the question of establishing a convention which codifies colors. What we have here, when we thus produce a "Mandelbrot monster", (a colored image of a fractal equation), is both a model of scientific knowledge, (it is as clear and distinct as is the code of numbers), and a model for aesthetic experience, (it is as rich in meaning as a work of art, which indeed it is). This may be put both ways: what we have done, by thus proposing a color code, is lifting scientific knowledge on the level of aesthetic experience, and it is also lifting artistic experience on the level of scientific knowledge. There is no longer any sense here in wanting to distinguish between art and science, because what we are doing here is to think scientifically in colors.

The example I just gave is only one among many possible other examples. It suffices to open any issue of the Scientific American to see how the colors are beginning to be codified for the purpose of exact knowledge, (computer simulations of nuclear, chemical, physiological phenomena come to mind, and also the deliberate color codification of photographs taken from satellites to show crops and so forth). On the other hand, it suffices to walk into any art gallery to see how an effort is being made to use colors for the articulation of exact knowledge. All those examples show how both scientists and artists try to codify colors, in order to overcome the crisis of scientific knowledge and of artistic production.



What is lacking, however, in all those efforts is a satisfactory cultural theory of colors. Both scientists and artists codify the colors in a rather empirical way, by chance or by some "intuition". As long as we do not have such a theory, the mutual prejudices between science and art will prevent that universally valid color codes which are both clear and "rich" be established. The idea that people will communicate in the future through colors, (alongside with words or even instead of words), is thus still utopian. This is one of the reasons why a project is being studied to build a "House of the Color", (Casa da Cor), in the city of Sao Paulo: to build a place where a cultural theory of colors might be elaborated. There is as yet no consensus between the scientists, artists, philosophers and communicologists who collaborate in that project as to how such a theory is to be formulated. Which of course increases the sensation of adventure in those who participate in that project.

The divorce between the sciences and the arts is due to the contempt in which science holds everything that is not exact. It is reciprocated by the artists' contempt for scientific reasoning, which seems to them to be "barren", poor in meaning. If colors were to be used as codes for exact communication, those prejudices would disappear in thin air. It would then appear that not only the heart has reasons which reason ignores, but that it is equally true that reason has a heart which the heart ignores, and that only if reason and heart become one, can we really develop the virtualities which are dormant within us. Color may be the place where those two can meet, and result in a new culture.