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CYBERNETICS AND THEMATIC ACTUALIZATION
IN THE VISUAL ARTS

Eric Purvis

Cybernetics has provided us with many discoveries for the arts, primarily in the area of expressive production. Art education however, has its own characteristics and needs.

In a period of such extraordinary advances in computer technology which require individual and social changes the educational system is in need of redirecting its efforts to the new technological realities. This evolving process has begun but because of the rapid advances in computer technology it has become not a system to change but rather a system of change. Every advance in the computer field gives rise to another advance which gives rise to another and so on.

Computers currently are used in general education for such purposes as: computer assisted instruction, computerized library function, information storage, information flow, and integrated records and procedures. Certainly the easy storage and rapid access of information has solved many time consuming problems of administration, but as educators the problems of providing quality instruction must still be the priority. In art education cybernetics holds much instructional potential but only the surface has been scratched.

Computers already have provided us with many discoveries for the arts in education, primarily in the areas of computer generated graphics, computer accessed curriculum, and record keeping. The search for what can be used is an important aspect of any teaching and learning process. The introduction of the computer into the classroom provides a base upon which the creative teacher can enhance the experiences of the learner. This is not a claim that the computer is intended to replace the teacher but rather that it is to be a supplement to an art program.

From a practical viewpoint a good number of computer assisted learning programs deal with quantitative concepts and deductive techniques of instruction. However, seeking what potential is available for computer use in the art classroom and the instruction of design concepts I have turned attention to the more qualitative nature of art and to the ingredients of what Robert Smith (1967) calls "influence" and "inference" as aspects of the inductive process which involves experimentation, discovery, evaluation, and assimilation of information.

The employment of cybernetics as a practical and mechanical instructional tool for aiding in altering perceptual tendencies can also serve some usefulness. It can be difficult for students to see beyond the image of a work of art and delve into the perceptual concepts or latent content but cybernetics provides control which may be useful in this area of concern. Cybernetics could be used to maintain direction of exploration for the learner in the art education environment.

Possibilities include exercises in visual thematic approximations of verbal concepts through organizational efforts by the learner. The exploration addresses perceptual tendencies and skills by thematic actualization; the learner seeking a reasonable or individually optimal solution to a design problem.

Themes in art may be literal or subjective in nature. For the purpose of this paper I refer more specifically to subjective themes supportive of the ideas, feelings, or images expressed through symbols generated by the artist. For example, the verbal concept of "swing" can have visual approximations which are not representational of the image of a swing. The brush strokes and/or shapes alone can make inferences about the concept of "swing."

Kandinsky (1974) suggested:

Form alone, even though abstract and geometrical, has its internal resonance...

...we have a subjective substance in an objective sheath.
(p. 47)

Langer (1953) in discussing this topic stated:

An image is indeed, a purely visual 'object.' Its importance lies in the fact that we do not use it to guide us to something tangible and practical, but treat it as a complete entity with only visual attributes and relations. It has no other; its visible character is its entire being.
(p. 48)

It may seem natural in the visual arts for the artist or appreciator to first reflect on literal relationships between the image and its referent object. But, as illustrated by Langer and Kandinsky, we realize that the measure of artistic creation is not realized through imitation. The ideas or feelings expressed by the artist about, or apart from, some referent object are visual themes which he or she is actualizing through expressive production. These organizational efforts are a reflection of the temperament of the artist and give direction over what is intended to be expressed.

In the teaching of design concepts the instructor is confronted with a variety of tasks, among which include the presentation of principles of design and their application. The teaching of these concepts involves making the implicit explicit. That is, what the mind feels or thinks about the meaning of symbols apart from their label or external representation. Those of us in the arts are quite aware of the relationship between perceptual principles and design concepts and that perhaps by their subjective nature they are a special area of concern. If learners are to "read" art works they must first be able to read and understand visual language. Eisner (1970) stated that if we are to experience the art forms we must have the ability to "decode" what the artist has expressed or "encoded." "Pictures need to be 'decoded' and comprehended in

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ways that are not unlike language, especially if they are works of art.
(p. 112)

There are a variety of types of encoding which are dependent on the symbol used, e.g. figurative, metaphorical, conventional, or non-objective. This encoded meaning is also subject to the organizational arrangement of the symbols as well as the selected media. Consider the arrangement of words as an example. "John loves Mary" and "Mary loves John" are two completely different sentences in terms of meaning. Simply by rearranging the order of the words the meaning has completely changed. So it is with visual design, the syntax or ordered arrangement of the images or symbols can change the visual meaning. There is a relationship between images, their arrangement and what is intended to be expressed.

The learner has three systems which Briggs (1964) has termed making, perceiving, and feeling. The interaction of these systems is evidenced in the production of art as perceiving involves affects which then encourage reactions. The visual perceiving system at first is attentive to the general properties of the visual field after which it may attend to the more specific internal and external distinctions. Perceiving may be automatic but is also learned. Bruner (1973) indicated that learning to perceive involves learning the relationships or interactions contained in the properties of the objects and that it is a matter of categorization. That is, the learner makes inferences about appropriate stimuli input and answers or responds by submitting the input to an appropriate category.

The non-objective or qualitative symbol, as Langer (1953) refers to it, is a symbol which may be representative of some idea, image, or feeling which the artist is using to communicate and has no assigned meaning or may be applied apart from their objective embodiment. The experience or meaning of these symbols is evoked by the expressive character of the symbol from its environment but sees it in terms of interactive forces as it relates to the format in which it resides. In thematic actualization the use of the qualitative symbol can be used in a cybernetically controlled learning situation to assist in altering or enhancing perceptual skills. In this way learners are referring to their understanding and interpretation of a verbal concept rather than attending to a referent object as the subject in a design problem.

A program design, especially in the initial stages, would need to remove the distractors. One solution to this problem is to present qualitative symbols on a proportional format using a computer digitized grid system to reduce the learner distractions of hedonic tone and the preparatory stages necessary to address the problem in a conventional way. The learner's attention may then be directed toward the specific nature of the problem and the judgements of the learner may then be fixated on the thematic solution by manipulation of the fixation symbol within the format and the non-verbal behavior may be elicited by a stimulus based on the concept of the thematic problem and the solution that represents it.

As this applies to the thematic solution of a design problem the learner first attends to the manipulation of the fixated symbol and its

general relation to the format at which point the learner will be able to make finer discriminations or distinctions. Since no truly optimum solution is established as standard this allows for individual differences and the goal of the program is to encourage visual discrimination skills through exploration and discovery learning.

The expected output of the learner cannot be maintained rigidly. It is in effect a non-transferable sensuous interpretation of a concept that learners may actualize which would demonstrate their efforts in understanding aesthetic development or the artistic process.

In considering a possible program which is suited to the instruction of this qualitative encoding system through design problems, the question is not "What is it?" but rather "What does it do?" The program is designed to encourage the learner to apply perceptual principles to solve verbal thematically induced problems. The ability to solve problems is at least to some degree, according to Briggs, enhanced by "relatively unprompted guided discovery"(p. 2). Since rote memorization, understanding of principles, and application of principles are three kinds of learning, a learning well suited for any one of these three kinds of learning is unlikely to be well suited for all three. A linear format is unlikely to be effective here since memorization, active review and rehearsal are not present. However, the use of a machine to control and communicate may have certain favorable characteristics. Since cybernetics deals with forms of behavior that are consistent with "regularity," or are "determinate," or "reproducible" (Smith & Smith, 1966) it offers the possibility of experimentation with new formats and procedures consistent with servo-mechanical functions.

The preliminary work in this phase of the project also includes development and design strategy of some of the materials used in the experiment. Since the system deals with the application of principles, the student at this point will be in control of the instruction so as to evaluate, speed, difficulty in terms of discrimination, freedom to accept or reflect their own strategies, and discovery through experimentation. Then they will be responsible to some degree for their own performances.

The program does not, and is not intended to, teach design concepts and principles directly but rather affords the learner the opportunity to apply the concepts to the principles within a cybernetically controlled situation with verbally induced stimuli.

The use of cybernetics in simulation games generally acts as a control system that is sensitive to feedback in terms of discrepancies between what is desired and what exists and responds to feedback through corrective measures. This program, however, is an experimental format which represents a break from conventional program formats and since there is no "wrong" answer in this subjective creative problem solving situation the computer is directly controlling, not by evaluation, but through maintenance of constraints and visual feedback and adaptability for evaluation. The learner has received the appropriate verbal theme and symbol and responds through manipulation of the symbol. As the learner manipulates the symbol he/she is able to "hone" in on a suitable response much the same as one would tune

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a stringed musical instrument constantly receiving feedback and responding.

With the assistance of a digitized computer grid system to help remove the hedonic tone the learner may actualize the theme and then "drop" out the grid to evaluate the format and symbol relationship with the corresponding theme. On response from the learner the computer monitor will bring back up the grid for further manipulation and discrimination.

Perceiving, thinking, and acting (or forming) are interactive. As one of these systems is attended to in the arts others cannot be neglected. As perceptual skills may be the focus of this cybernetically controlled plan none of the three areas is neglected. This plan is to encourage the learner to strive for the best possible solution in his own direction, use his fullest potential through exploration and discovery.

Rudolf Arnheim (1969) stated that "we are heirs to a culture situation in which "our eyes are being reduced to instruments by which to measure and identify" and that mere exposure to art is not sufficient to reawaken our eyes. (p. 1) If one is working with the principles of design then the ability to measure and label is insufficient and the awareness of the visual syntax and its relation to the intended idea or emotion is essential.

In exploring the potential of the cybernetically enhanced instructional programs we must capitalize on the advantages of the computers in instructional management. We cannot assume that the possibilities of computer assisted instruction exist only for quantitative content. As art educators we need to examine cybernetic applications to qualitative content as an essential part of the exploration of computer instructional resources potential.

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