

A CONCISE LANGUAGE FOR THE COMPUTER GENERATION OF KINETIC ART

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ABSTRACT

To define criteria for a computer medium to execute non-objective art, we have tried to isolate media-independent characteristics of art, and general characteristics of artist-media relations. Art is seen as the vehicle of a general dialogue of feeling; and consequently, it requires its practitioners to access their own genuine feelings about events, usually against the difficulties of self-censorship. Improvisation with media is a widely-used and reliable aid in this respect, hence the enablement of coding at improvisatory speeds is seen as a criterion for artist-machine interfaces.

Non-objective art deals in highly structured imagery, being thus amenable to computer execution using a symbolic language of instruction. Machines for real-time performance of this art would optimally have functions reflecting the concepts of the language, just as piano keyboards owe their configuration to scales. No received theory of visual elements, or a corresponding language, is known to exist, however.

CLAR2T is an interpretive and executive graphics software package which processes a numerical kinetic art language of an ad hoc nature, one sufficiently simple to permit a skilled user to code sequences with fluency. CLAR2T is seen as a lab for the further development of linguistic concepts.

ABRÉGÉ

Afin de définir les critères pour obtenir des créations artistiques non objectives par ordinateur nous avons essayé d'isoler les caractéristiques de l'art qui ne dépend pas du medium et les caractéristiques générales des relations entre l'artiste et le medium. L'art est considéré comme véhicule d'un dialogue général concernant des impressions et, par conséquent, il faut que les artistes prennent conscience de leurs propres impressions bien sincèrement en limitant autant que possible l'effet de leur propre censure. Pour y parvenir on estime que l'improvisation avec les outils des media est une technique très utilisée et valable. Par conséquent, la capacité d'amorcer des instructions codées, à une vitesse appropriée à l'improvisation, semble être un critère de l'efficacité des appareils de dialogue entre l'homme et la machine.

ABRÉGÉ (cont.)

Puisque l'art non-objectif traite d'images de structure complexe, il est convenable de le faire par ordinateur, en utilisant un langage symbolique d'instructions. Les machines pour l'exécution de cet art, en temps réel, doivent avoir des fonctions qui reflètent les concepts du langage comme un clavier de piano reflète les gammes. On ne sait rien de l'existence d'une théorie reçue des éléments visuels ou d'un langage semblable.

CLAR2T est un groupe de programmes pour l'interprétation et l'exécution du dessin graphique. Il traite d'un langage numérique et cinétique d'une nature ad hoc qui est adéquatement simple pour que l'utilisateur qualifié puisse coder les séries facilement. On considère que CLAR2T est un laboratoire pour le développement de concepts linguistiques.

Introduction

Our interest in this work is in what arises from linking computer technology to the conceptual environment of non-objective art - trying, at the same time, to avoid putting old wine in new bottles. The problem itself is not a new one, having had initial investigation by A.M. Noll as early as 1964 (1).

Two years ago, when our present work began, we wanted to find a way to get computer execution of entire strings of instructions for image generation and change, without needing human interaction at each step. Since then our view has become more general, and we have felt the need to access both some general theory of man-machine interfaces, and a theory of the elements of visual form sufficiently comprehensive and powerful to make it comparable to that of music. We began to feel we were trying to model an instrument without knowing how to conceive its functions, let alone the most humanly-effective way to access them - in a sense, trying to design a piano with knowledge of neither scales nor keyboards.

To define initial criteria we took a hard look at art itself, under three headings. We enquired first about the cultural function of art; then about what, generally, artists strive for in their working relationships with media; and finally, we formed some notions about the basic formal concepts of non-objectivism. The criteria that emerged have proven somewhat large for our present capabilities.

Art as specialized communication

Art perhaps owes its persistence in human affairs to this, that it represents the general dialogue of feeling. Tolstoy (2), like the psychologist Bartlett (3), found a component of feeling in all human acts, even in the most "objective" ones. Tolstoy delimited art, for simplicity, to those areas in which the expression of feeling is conscious and formalized. There is considerable agreement to be found with Tolstoy's position in Dewey (4), Langer (5), and in a somewhat oblique way, Werner Heisenberg (6); that is, if we equate feeling with what Heisenberg refers to as the spirit of the time, an entity he considers quite real. He sees both science and art as engaged in the formation of increasingly powerful languages of discourse, but obviously with different areas of attention. Suzanne Langer provides the most presently useful summary: "The primary function of art is to objectify feeling so that we can contemplate and understand it."

Artists and their media

Our veneration of rational thought since Descartes, or the efforts we make to develop social masks, or both, may have helped to make our genuine feelings about events as difficult to identify as they notoriously are. The artist needs, for whatever reason, a way to outwit his own censorship in the Freudian sense of this term. Van Gogh expressed this poignantly: "There is something inside me. What, but what is it? . . . men are often prevented from doing anything, prisoners of I don't know what . . . horrible cage!" (7)

As a result, artists typically work long to gain fluency in their use of a medium, and such understanding of the effects it produces as to be able to manipulate it with minimum attention. They seek, in short, the ability to use a medium effectively at improvisatory speeds. During improvisation, the ability of self-censorship to keep pace with intuitive output is greatly diminished. This process is perhaps most open to observation in musical improvisation, but may certainly be present in line drawing, or drafting poetry. Paul Klee spoke of allowing pictures to come into being, of knowing a great deal about the pictures, but knowing it later (8).

Non-objective art

In this mode, image synthesis springs more from inner vision than from observation of the environment. Nature may supply the data, but the amount of processing has increased. Whether we consider the early practitioners such as Kupka, Delaunay, Mondrian or Kandinsky; or such contemporaries as Vasarely or Brigit Riley, we find that relationships between forms or colours - syntactic considerations - are prominent at the expense of the forms themselves, which tend to be simple.

Interest in the systematic use of picture elements is to be found throughout the life of the non-objective movement, which began in the first decade of this century. Now, when we wish to make computer-executed kinetic art, this interest intensifies; since the necessity rises to communicate beyond ourselves, to a machine, about both the picture elements and sequences of change.

We need now only isolate the criteria. They ask for:

- 1) An adequate theory of the elements of kinetic visual form.
- 2) An artist-machine interface enabling real-time calls and responses related to the functions implicit in the theory.
- 3) A symbol set representing both temporal and visual elements defined in the theory. This should be capable of pencil-and-paper manipulation when the user is distant from machines. Sequence designers can be expected to be pre-visualizers, and to wish to symbolically record their ideas in these circumstances. This is recognized as a vanishing criterion, since distance from machines is tending to vanish as a condition of life.
- 4) The symbol set should be machine-readable.

Work report

Our film was made with CLAR2T, a software package which responds to the criteria, if in a primitive way. The code it employs is of an ad hoc nature, calling functions selected arbitrarily, rather than from any theory of the elements of kinetic visual form. Because it is relatively concise, and describes output rather than the machine functions required to produce output, the code permits the skilled user to frame sequence concepts with some fluency. The code is numerical, and uses eight word types of a six

digit width.

Of greater interest may be a pictographic version of the code at present in development. The pictographs express sequence concepts with more economy than the numbers, and, as a result, are capable of more rapid use. At present, however, we must derive numerical code from the pictographic code for machine input purposes.

CLAR2T has succeeded to the extent that it permits the control of change, including its time-structure, with some of the sensitivity required in art. With the When somewhat in hand, the How and What remain to be treated. Symbolic approaches to sequence representation are seen as useful to kinetic artists for their effect of reification, as well as for the reasons offered above.

Appendix

Notes on the code

In order to obtain a working system as soon as possible, we elected to make our code call functions supportable by systems software already in library. As well as programs to handle display data in addressable modules, there existed a perspective conversion and a mapping routine. Thus CLAR2T manipulates up to 21 forms (data modules), simulating their motion in 3-space.

The first digit of each of the eight code words is a constant, functioning as a word identifier.

<u>first digit</u>	<u>word function</u>
1	timing matrix specification*
2	instruction sub-string store and recall
3	form specification
4	position specification
5	display/colour assignment
6	rotation
7	scaling
8	translation

In each word, the meaning of the five trailing variables is place- as well as magnitude-dependent. The display word is here broken down (for convenience, the word is represented vertically):

<u>digit</u>	<u>range</u>	<u>interpretation</u>
5	5	word type constant
X	1-0	1 = on, 0 = off
X	1-9	pointer to members of a timing matrix, containing values expressed in film frames
X	0-1	colour instruction, 0-14 0 represents white
X	1-9	
0	0	unused

A provisional pictographic symbol set is offered in plate 1. To facilitate comparison, a very short (27-frame) sequence with three forms has been coded both numerically and pictographically, the two encodings being shown together in plate 2. Plate 3 is a still photograph of the sequence.

A users manual to the CLAR2T language is to be found in "A Computational Medium for Kinetic Non-Objective Art" (C. Playfair, M.A.Sc. Thesis, U. of Waterloo, 1973).

References

- (1) Reichardt, J. Cybernetics, Art and Ideas. Studio Vista, London, 1971.
- (2) Tolstoy, L. What is Art? 1898. English Printing, Oxford, 1962.
- (3) Bartlett, C.F. Remembering. Cambridge University Press, Cambridge, 1961.
- (4) Dewey, J. Art as Experience. Capricorn, New York, 1958.
- (5) Langer, S.K. The Cultural Importance of Art, from Philosophy in a New Key. John Hopkins Press, Baltimore, 1962.
- (6) Heisenberg, W. Physics and Philosophy. Harper, New York, 1958, p. 109.
- (7) Huyghe, René. van Gogh. Cowan, New York, 1960.
- (8) Lynton, N. Klee. Spring Books, London, 1964.
- (9) Horowitz, M.J. Image Formation, Cognition. Appleton-Century Crafts, New York, 1970.

*Nine such matrices are available. Changes in timing matrices effect changes of tempo in the output.

A PROVISIONAL GRAPHIC INSTRUCTION SET

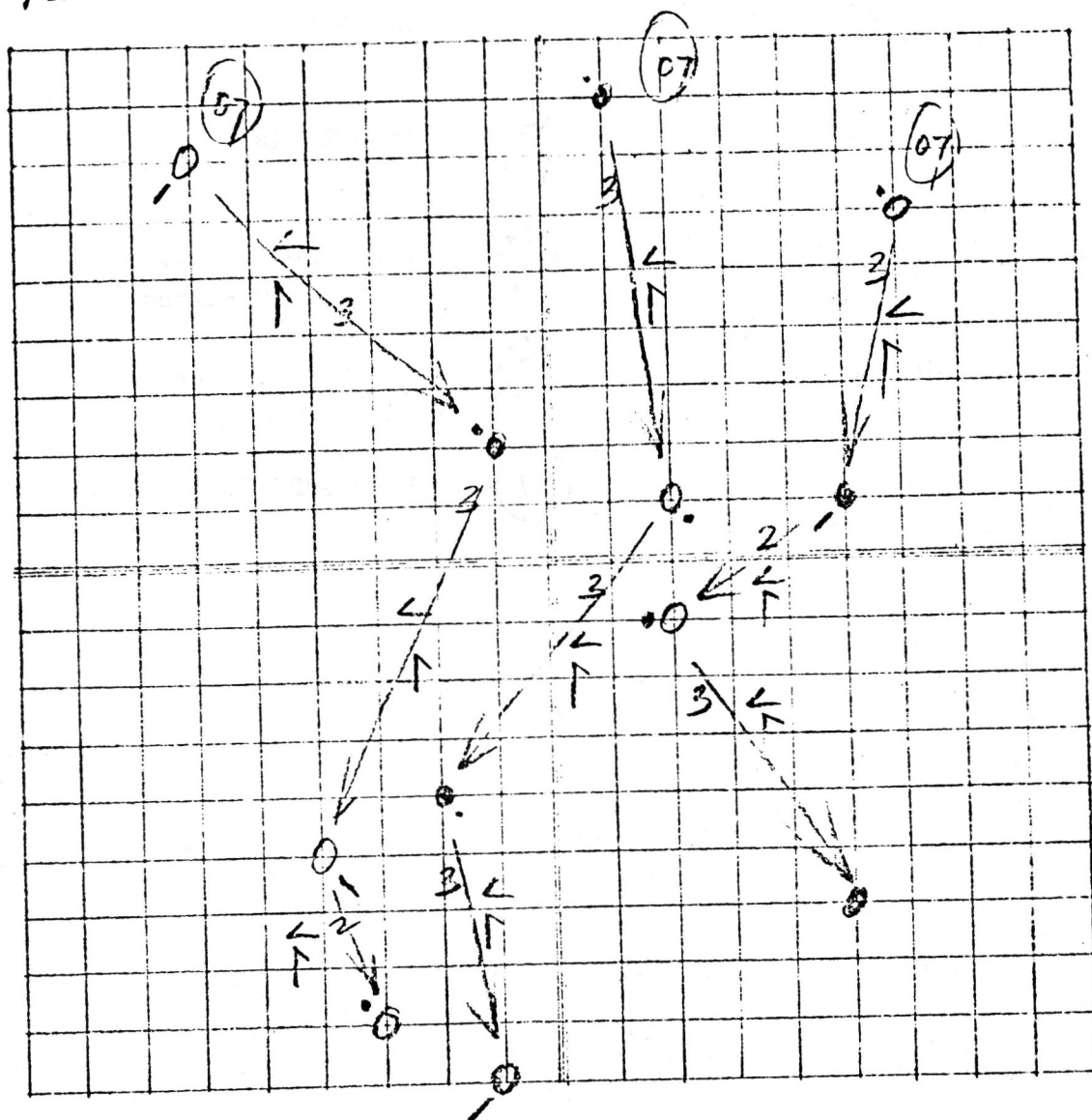
ROTATION ABOUT X AXIS		INCREMENT 3.75		ENLARGE (x2)
		7.5		REDUCE (x2)
		15.		POSITION , front rank of sub-cubes
		30.		" , rear
		180.		FORM SPECIFICATION

ROTATION ABOUT Y		3.75
		7.5
		15.
		30.
		180.

ROTATION ABOUT Z		3.75
		7.5
		15.
		30.
		180.

STRING CONSISTING OF THREE SHORT
FORM HISTORIES, CODED GRAPHICALLY
AND NUMERICALLY

T3



130300

307010

467420

513000

677000

812260

677003

854730

677002

828230

307020

418250

513000

677000

821610

677003

824670

677003

819430

307030

466210

513000

677000

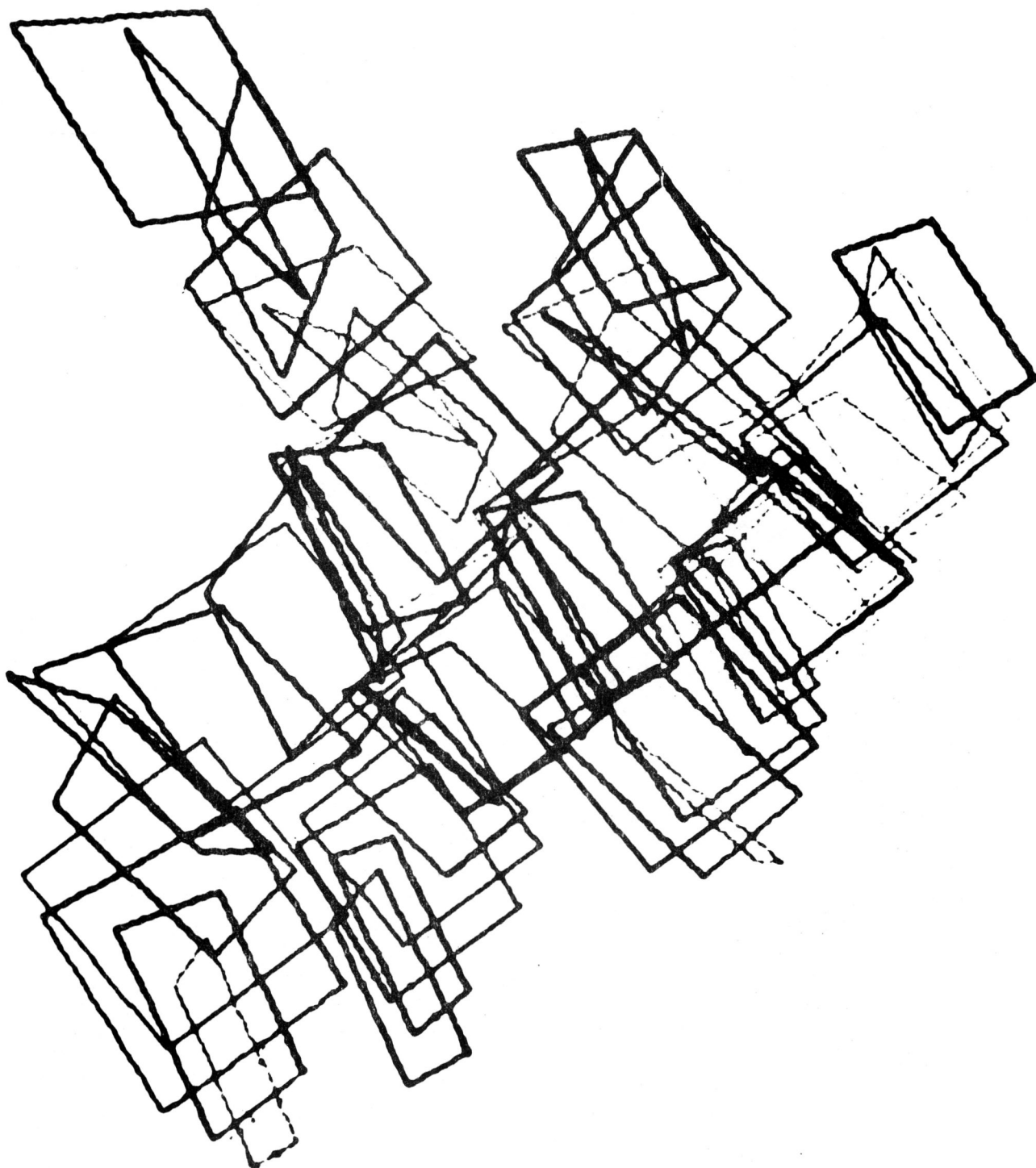
851450

677002

822390

677003

856080



OUTPUT GENERATED BY CODE ON PLATE 2