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From canvas to computer: Harold Cohen's artificial intelligence paradigm for art making

Morbey, Mary Leigh, Ph.D.
The Ohio State University, 1992

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FROM CANVAS TO COMPUTER:
HAROLD COHEN'S ARTIFICIAL INTELLIGENCE
PARADIGM FOR ART MAKING

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Mary Leigh Morbey, B.A., M.A.L.S., Drs.

*****

The Ohio State University

1992

Dissertation Committee:

T. Barrett
C. Csuri
J. Koroscik
M. Parsons

Approved by

[Signature]
Adviser
Department of Art Education
To
my husband Graham

To
my friend Calvin Seerveld
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VITA

April 1947 ............................................ Born - Charlottesville, Virginia

1969 ..................................................... B.A., Art, Wheaton College

1972 ..................................................... Master of Arts in Liberal Studies in the History of Art, Hollins College

1976 ..................................................... Doctorandus in the History of Art, Free University of Amsterdam (The Netherlands)

1978-1980 ............................................ Lecturer, Assistant Professor, and Department Chair, University of Maine at Machias

1983 ..................................................... Lecturer, Wilfrid Laurier University (Canada)

1984-1987 ............................................ Instructor and Lecturer, Redeemer College (Canada)

1987-present ...................................... Assistant Professor and Department Chair, Redeemer College

PUBLICATIONS


v


FIELDS OF STUDY

Major Field: Art Education

Studies in Art Criticism in Art Education.
Professor Terry Barrett.

Studies in Art History.
Professor Carel Blotkamp.
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CHAPTER I

AN OVERVIEW

I am an art historian but in 1983 I began experimenting with making art on the computer. I collaborated with a computer scientist at the University of Waterloo, Waterloo, Ontario. The President of the university had commissioned a team of five visual artists to do experimental art making on the university's million dollar computer PAINT system. During time intervals needed to alter computer operations to enable more diverse art making possibilities, I would read through computer science journals focusing on articles discussing computer graphics. It became clear that in the initial phases of the merger of art and the computer that there was little discussion of a theoretical framework for art making on the computer. Also apparent was the lack of art criticism, and of course, one could hardly expect any art historical recording of such a young development. The focus in these years was on questions concerning art and the computer, with an emphasis on the problem
of whether computer generated imagery could be considered art.

I soon focused my attention on the problem of the relationship of art making on the computer and art historical recording and criticism concerning contemporary artistic developments that employed the computer. I wondered how as an art historian I could record this innovative, interdisciplinary, computer science-visual arts endeavour. It occurred to me to look for a trained fine artist, who had recognition as a contemporary artist, and who then chose to use the computer in art making. This would provide a definite link to art history and a platform from which to begin a discussion of this new and uncharted territory.

In a review of the literature I located three specific modern artists, who among others, had received acclaim in more traditional art making and had then moved on to the computer: Englishman Harold Cohen, American Philip Pearlstein, and Dutchman Peter Struycken. Further study indicated that Harold Cohen was probably the most internationally recognized of the three, and thus a good topic for a study.

I began by investigating Cohen's early years as a drawer and painter that led to his internationally acclaimed paintings of the 1960s. I surmised that an investigation of his shift to the computer in the late 1960s would show a continuation of his more acclaimed work, and thus provide a beginning discussion point for the building of a theoretical framework for art making on the computer. Such a basis would assist also in the setting forth of how to go
about teaching art making on the computer at all levels of art education. To my dismay, there was little art critical or art historical literature on Cohen's art making on the computer. Cohen's more traditional art making, that is his painting on canvas, has been well documented by both art historians and art critics. In sharp contrast to this documentation is an immense lack of both art historical and art critical analysis of his work on the computer. This art historical gap in the art making of Harold Cohen provides the focus of this study.

Background, Purpose, and Need for the Study

Harold Cohen is known for his English Abstract Expressionist paintings. His works Tribune (Plate I) of 1962 and Before the Event (Plate II) of 1963 are owned by the Tate Gallery, London. Before the Event is placed in a prominent location in a smaller Tate gallery that focuses on modern British art of the 1960s. In 1965 Cohen's work was included in Documenta III in Kassel, Germany, and in 1966, along with four other artists, he was chosen to represent Great Britain at the XXIII Venice Biennale and sent the painting Pastoral of 1965. Michael Compton of the Tate Gallery comments upon Cohen's artistic success: "From about 1952 until 1968 Harold Cohen built up
PLATE II. Harold Cohen, Before the Event, tempera and oil on canvas, 98" x 116", 1963.
a reputation as a painter equal to that of any British artist of his generation.\textsuperscript{1}

In 1968 Cohen spent one year as a visiting professor at the University of California at San Diego. Early in his visit he became involved with the computer and in subsequent years with a group of computer scientists at Stanford University working in artificial intelligence. This involvement led him to change from canvas painting to art making on the computer using canvas, ink, and paint as "primary output" media.\textsuperscript{2} For the last two decades his work has been mainly computer generated. This imagery has received only a small amount of serious criticism from visual art critics and art historians. This lack of criticism contrasts sharply to over two hundred articles written about Cohen's abstract expressionist paintings. Alan Bowness, director of the Tate Gallery, assessed Cohen's career in a 1983 Tate Gallery exhibition catalogue of Cohen's work.

Harold Cohen first made his reputation as an abstract painter in London in the 1950s, and the Tate Gallery owns two important works of 1961 and 1962. The artist's move to the west coast of the United States shortly afterwards and his abandoning of easel paintings for more experimental media have meant that we have lost sight of one of the outstanding talents of our


Cohen's art making activity in the late 1960s, incorporating in an interdisciplinary manner the new discipline of computer science, caused difficulty for formally trained art historians and art critics of the 1960s and 1970s. Our contemporary pluralistic milieu, however, facilitates interplay between art and science, and provides the space in which to take a more complete account of Cohen's artistic contribution. In recent days, art historians such as Cynthia Goodman have begun to record the developments of making art on the computer. Her exhibition catalogue Digital Visions: Computers and Art, that accompanied the 1987 exhibition of the same name, recognizes Cohen as a main contributor to this new area of art making. Goodman's brief commentary, along with short essays by art historian Michael Compton and artist Andrew Forge, comprise the sparse art historical writing on Cohen's computer generated imagery.

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The Research Problem

This study will trace, from the vantage points of art history and art criticism, the development of Harold Cohen's career from his art training at the Slade School of Art, University College, London, England, to his success as a painter, to his more current computer generated imagery. The project will describe Cohen's development, attempt to define a central theme that unifies the body of his work, and fill in the historical gap between his paintings and computer generated imagery. This study will answer a series of questions: What motivated his transition to the computer? Why has the visual arts community disregarded Cohen since 1968? Why has he been embraced by the computer science community that works in the area of artificial intelligence? What is the significance of Cohen's interdisciplinary activity linking art, artificial intelligence, and the computer? What are the implications of Cohen's art making for art education?

Significance of the Investigation

Two important considerations demonstrate a need for this study of Cohen: his acclaim within and then subsequent abandonment by the visual arts community, and the lack of a location for his computer imagery in the ongoing history of art. First, both Bowness and Compton write about the high
quality of Cohen's artistic production on canvas during the early years of his career (1956 -1968), and further, Bowness observed that historians and critics lost sight of him when he moved to California and the computer. This gap in critical appraisal of Cohen's computer related imagery and the relationship of the computer work to his earlier work provides an excellent opportunity for original art historical research and is a motivation for this project.

With Cohen's movement to the computer and the subsequent loss of interest in him by scholars and critics in the visual arts, it was specialists in artificial intelligence that took over and lauded his art making efforts. Cohen's use of artificial intelligence for the investigation of art making caught the attention of those interested in artificial intelligence, particularly in light of the fact that Cohen's computer generated imagery is one of a few successful examples of the use of artificial intelligence in the visual arts. In the last two decades it has been the artificial intelligence community that has become Cohen's new audience, documenting and encouraging his experimentation. There remains a vital need for art historical documentation and criticism of Cohen, commencing with his paintings, following his move to the computer, chronicling his art making on the computer, and commenting on the significance of this body of work.

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The young history of computer related art and Cohen's location within it comprise a second area of consideration. From the outset, artists working on the computer have been troubled by their attempts to bring together science and art. Scientific, technical, commercial, and artistic experimentation on ways to use the computer commenced in the mid 1960s. In 1962 Ivan Sutherland defined his Sketchpad system for interactive computer graphics in his doctoral dissertation for MIT. The user of sketchpad could draw with a light pen directly onto the computer screen and immediately observe the results. The developments of Sutherland's sketchpad caught the attention and funding of the Defense Department. Around 1965 German mathematicians Frieder Nake and George Nees, along with Americans, physicist A. Michael Noli and artist John Whitney, began experimenting with art making on the computer, to be joined by Americans Kenneth Knowlton and artist Charles Csuri. Computer artist Darcy Gerbarg describes this pioneer venture.

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7Goodman 22.
8Goodman 22.
[It] is dependent on a technology that was originally developed for scientific purposes. The technology is computer graphics, a development of computer science which had its beginning in aerospace research. This same technology was further developed by the military for surveillance, and by industry for use in designing and manufacturing airplanes, automobiles, etc. Later the textile and printing industries developed computer graphics techniques for their specific applications and now these tools have become available on a broader scale to the artist.10

Gerbarg's statement alludes to a continuing difficulty of computer graphics, that is, the union of two dominant streams situated in differing philosophical outlooks. The interactivity of art making and the computer, that I label as computer related art and includes Cohen's art making on the computer, originated from a basis developed for scientific purposes and found its early manifestation in computer science based computer graphics, rather than in a footing in the traditions of the visual arts.11 Thus, computer related art activity works out of a computer science basis that substantially differs theoretically and historically from visual arts developments. This


11Although the label computer related art incorporates the interactivity of art and the computer, there exists strong differences between artists using the computer for art making. For example, Harold Cohen's work is generated by the AARON program that he wrote and this is fundamentally different from the work of Darcy Gerbarg which is generated through the use of a purchased program. Cohen raised this distinction in the requested and recently received "Corrections and Comments on the Text," of this dissertation, February 17, 1992, 4.
differentiation is manifested, for example, in the computer scientist's interest in producing three-dimensional realistic models, somewhat similar to the Albertian Renaissance prototype that models Alberti's method of creating one-point linear perspective on a flat surface, for commercial usage. The visual artist, however, pursues the process and development of art making not so directly purposed for commercial consumption.

In addition to this awkward alliance of scientific technology and visual art making, reminiscent of the joining of science and the visual arts during the early Renaissance in Italy to further art and architecture, a variety of terminology has emerged to describe and discuss art generated by the computer. I am using the term "computer related art" to label the twentieth century cross of art and science and to incorporate all art that is computer generated for there exist several terms labelling the interactivity of the computer and art. This overarching label includes computer art, the first term developed to describe art made by the computer; computer graphics, a component of computer science dedicated to generating graphics; electronic art, electronically produced art; and more recently digital art, art produced on a digital machine.

12Richard H. Hill in "Conceiving Art in the 80's," given at the International Conference on the Digital Arts, Vancouver, British Columbia, August, 1983, suggests that the early Renaissance concept of art is more appropriate for the interaction of art and computer technology than our more immediately present concept of modern art, 4-5.
Cohen's computer related art links developments in the artificial intelligence branch of computer science with the expertise of an established art maker. His central concern focuses on what he designates as visual cognition, that is, an exploration of "the cognitive principles underlying visual representation," in an attempt to understand the cognitive formulation of visual structure and how visual structure yields meaning to the art viewer. This study will locate the origin of this primary concern of Cohen's, trace its development through Cohen's investigations, and search out a possible link that connects his modernist paintings with his more recent computer generated imagery. Further, the study will review his place in modern abstract expressionist painting and locate him in the developing history of computer related art.

Cohen's current inquiry into how the mind forms visual representations (structures) and how visual structures yield meaning to the viewer reflects an ongoing concern of humankind, involving both the east and the west and dating back many millennia. Cohen explores this inquiry through the employment of the artificial intelligence viewpoint of friend Herbert Simon,

based in our western rationalistic philosophical tradition. Simon, and his colleague Allen Newell, developed the physical symbol system approach to artificial intelligence that assists Cohen's investigation of this elusive human activity of how cognition works in the forming of imagery. Cohen uses the computer as an analogue of the human mind.

In light of art education concerns with art, cognition, and education, a deeper knowledge of how the human visual cognitive process works can only enhance the understanding of those who teach others how to make and read visual imagery. Cohen investigates how visual cognition functions through the use of a computer program that simulates human art making. A more thorough understanding of how the mind visually processes can only enrich visual activity at all levels. Cohen, "a child of his time," incorporates current research in cognitive science and artificial intelligence to explore visual

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questions through the tool most indicative of late twentieth century life and thought, the computer.

Methodology

I am going to use an interdisciplinary, contextual, art historical approach that incorporates the examination of Cohen's imagery, its theoretical and historical contexts, and the situations in which the work is presented. I will delineate the art historical context of Cohen's work including a chronological discussion of ideas and styles from his early years as an art student at the Slade School of Art, through his modernist paintings, to his current computer generated imagery.

I will, in the progression of the writing, introduce the literature on which the study builds rather than combining it in a separate chapter. The body of literature will include writings by Cohen on his art making, writings on Cohen as a modernist painter and as an artist working with the computer, and literature concerning the Slade School of Art, computer related art, and the computer science vein of artificial intelligence.

The formalist methodological approach, based on Greenberg's theory that emphasizes the analysis of the formal elements of an art work, in particular form, color, and flatness, dominated art critical and art historical analysis during the 1950s, 1960s, and 1970s. This approach worked well for
the analysis of Cohen's abstract expressionist paintings, and although the computer imagery can be analyzed formally, this approach gives little accounting of the hardware, software, and generation of Cohen's computer imagery. Greenbergian formalism afforded little room for art historical and art critical treatment of those who strayed outside the parameters of formalist theory, as is the case with Cohen's computer imagery. Hence, there is a need for an interdisciplinary strategy that will bring about a fuller discussion of Cohen's art. In the 1980s art history and criticism have broadened to incorporate a variety of methodological possibilities: Marxist revisionism, feminism, structuralism, post-structuralism, and deconstructionism, all interdisciplinary approaches. An interdisciplinary contextual methodology takes account of the variety of components that comprise Cohen's work on canvas and computer, and should work well for an art historical critique of

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Cohen's imagery.

Working from an interdisciplinary viewpoint centering on context, I will look at style analysis from art history, interpretation from art history and art criticism, history and theory of developments of modern art, contemporary art, and computer related art, and theories of artificial intelligence from computer science, in order to reach a fuller understanding of Cohen's contribution to and place in the history of art.

I will employ Barrett's three category model for contextual analysis to organize the diverse components that comprise Cohen's basis for art making on both canvas and computer.\textsuperscript{18} Internal context considers the art work, describing medium, subject matter, and form, and the interrelation of the three.\textsuperscript{19} Original context is history, including the history of the Cohen and his works, art history, social history, and histories of computer related art and the artificial intelligence vein of computer science.\textsuperscript{20} External context is the circumstance in which Cohen's art works are presented, whether it be the work on a gallery wall or the critic's review of the work, and includes those who chose to critique his paintings and ignore the computer imagery.\textsuperscript{21} This

\textsuperscript{18}Barrett 76-83.
\textsuperscript{19}Barrett 76-77.
\textsuperscript{20}Barrett 77-79.
\textsuperscript{21}Barrett 79-83.
tri-focal contextual approach provides a method of analysis of the diverse areas of Cohen's art making. Barrett's contextual model will assist the structuring of my analysis of Cohen and help me more fully make connections between Cohen's art making on canvas and computer.

A pair of recent exhibition catalogues, consistent with Barrett's contextual schema, offer models on how to go about an art historical treatment of Cohen. Kazimir Malevich and John Marin are excellent contemporary examples of art historical investigations of individual artists. Although the two catalogues vary in formulation with the single writing of Ruth Fine in English sharply contrasting the bi-lingual (Russian and English) and bi-cultural approach to Malevich incorporating writings of both Russian and Dutch art historians, their strength lies in the use of primary resources, that is the artist's works, writings, letters and interviews. Both writings, as well, appropriately depict the historical milieu out of which each artist grew and developed. They employ secondary sources to supplement the use of primary sources: catalogue introductions, articles, and reviews by scholars. In addition, both volumes offer an extensive chronology of the artists' careers and Fine's John Marin includes an expanded "Selected Bibliography," a contribution to ongoing research.

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Marin research. The Cohen project will follow this focus on primary source material, in particular, interviews with Cohen, analysis of Cohen imagery, and an examination of his writings about his art. A purpose of my methodological approach is to understand, as fully as possible, what Cohen is about through the use of primary sources. Secondary sources will supplement primary sources, giving place to chronology and the surrounding historical milieu. This study differs, however, from the writings on Malevich and Marin because it focuses on one specific problem of Cohen’s art making, the apparent lack of connection between Cohen’s canvas and computer imagery, whereas the two catalogues cover the individual artist’s life work.

In Chapter Two I will consider Cohen, the painter, by tracing his training at the Slade School of Art, locating him within the development of Modern English art, and noting his contribution. In Chapter Three I will relate the history of art making with computers and place Cohen’s contribution within it. A review of Cohen’s incorporation of artificial intelligence will clarify the relationship of his art making to artificial intelligence and the computer. Chapter Four will look at commentary on Cohen by art critics, art historians, and computer science and artificial intelligence experts. In Chapter Five I will analyze Cohen’s canvas and computer imagery. In Chapter Six I will present Cohen through his writings and interviews, and will discuss his art making on canvas, his move to the computer, and his computer generated imagery. In Chapter Seven I will draw
interpretative conclusions about Cohen. These will take into account what he says, what critics say about his work, and my viewpoint of Cohen's work. I will suggest the implications of this study of Cohen's work for the field of art education, and will recommend areas for further study that arise from this project. Cohen's recently written response to the study will be included in Appendix B.
CHAPTER II

COHEN THE PAINTER

Harold Cohen is a world renowned English modern painter in the vein of Greenbergian modernist formalism. Michael Compton, of the Tate Gallery, London, and curator of the 1983 Cohen exhibition at the Tate, has noted that Cohen's artistic success and reputation as a painter equalled any British artist of his generation.¹ As this study will demonstrate, a knowledge of Cohen's background is essential for an understanding of his acclaim as a modernist painter and integral to a unified interpretation of his early and later art making.

First, I will discuss Cohen's training at the Slade School of Art, University College, London. Second, I will give an account of Cohen's modernist production from 1951 through 1968. Third, I will review the five

strands of modernism that makeup English modernism and point out the influences that affect Cohen's art making. Fourth, I will consider the relationship of Cohen's work to Abstract Expressionism and, in particular, to field painting. Finally, I will uncover a central theme in Cohen's early work that persists throughout his art making.

The Legacy of the Slade School of Art in the Art Making of Harold Cohen

Cohen's art training at the Slade School of Art from 1948 to 1951 is pivotal to an understanding of the development of his art making. Cohen came to the Slade at the end of World War II after his service as a radar engineer in the Royal Air Force from 1946 to 1948. His English private school education provided him with a strong training in physics, mathematics, and advanced level art.

Before considering his study at the Slade, let us look more generally at its curriculum during the 1800s and up to the mid 1900s. This curricula development provides the foundation of the curriculum that Cohen experienced during his three years of study at the Slade. In 1781, through the Felix Slade endowment for the promotion of the Fine Arts in Great Britain, professorships were established at Oxford and Cambridge.² In addition, a

"Felix Slade Faculty of Fine Art" was founded and joined to University College, London, with the objective of teaching proficiency in drawing, painting, and sculpture. Sir Edward Poynter was the first Slade Professor in London, delivering his inaugural address at the school's opening on October 2, 1871. John Ruskin accepted the first chair at Oxford, and Sir Matthew Digby Wyatt at Cambridge. Alphonse Legros, as the second principal and the first drawing professor, emphasized the French academic approach to drawing. This emphasis remains an identifying characteristic of a Slade education today.

An emphasis on drawing was central to the curriculum of the French Academy master/apprentice tradition. During the mid-nineteenth century the first task of the French master was to provide a strong training in drawing that would lead a student through a successful completion of competitions, toward the attainment of the highly regarded Prix-de-Rome. Instruction in painting followed the concentration on drawing from plaster casts and live

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3Fothergill 5.

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models, followed in turn by instruction in the practice of copying, and then composition, a nineteenth century addition to the Academic tradition.® Throughout Cohen's years as a student the curriculum emphasized drawing, with no instruction in copying nor composition.®

During Cohen's first years at the Slade William Coldstream replaced the recently deceased principal R. Schwabe. To gain a clearer view of Coldstream's impact on the Slade curriculum as its administrative head from 1949-1975, let us review a significant March 1938 debate on "Realism versus Surrealism" that occurred at the Euston Road School, London, where Coldstream taught before he joined the Slade. Four artists founded the Euston Road School in 1937: Victor Pasmore, William Coldstream, Claude Rogers, and Graham Bell.® During the debate, Coldstream and Bell upheld the school's realist ideas by expounding the straightforwardness of the realists against the pretence of the surrealists.® The Euston Road painters, not wishing to impose a style or feeling a need to be progressive, encouraged observation. Measurement was stressed, to capture an objective rendering of the object, and inspiration was drawn from Degas's brushwork and Cezanne's

®Boime 21-47.
®Cohen, "Corrections" 5.
®Spalding 118.
®Spalding 118.
searching analysis. The outbreak of World War II brought an end to the Euston Road School, Coldstream moved on to the Camberwell School of Art, and was then appointed to the Slade as its principal, where he taught for almost three decades. Coldstream, as chief administrator, shaped the curriculum and brought together the faculty that would influence and mold the young Cohen. With the use of the term "influence," I am indicating the direct affect of Cohen's teachers on the development of concepts that shape his art making.

In a recent interview, Cohen's discussion of the influence of Coldstream, Lucas, and Rudolph Wittkower was illuminative. He said that with Schwabe's death and under Coldstream's headship, the Slade changed from being a French classical school of drawing to a more contemporary, but still somewhat traditional, school of art. Cohen notes that he, as well as his brother Bernard, current principal of the Slade, were the first Slade graduates to enter the British avant-garde.

12 Spalding 119.
To further this movement from the old guard toward a new, Coldstream brought in Andrew Forge to teach painting, and the celebrated art historian Rudolph Wittkower as Professor of Art History. The curriculum retained the French prototype in which the students worked from models and the teachers functioned as mentors. The only formal requirement was an art history course, provided each semester by guest lecturers. During Cohen's years instruction in art history was given by Wittkower and guest lecturers Ernst Gombrich and Kenneth Clark.\textsuperscript{16}

During this period, Cohen also studied materials with Lucas, the chief restorer of paintings at the National Gallery in London. Cohen attributes his "understanding of painting as technology, and of the painting as a rationally constructed object to Lucas's teaching."\textsuperscript{17}

In addition to the studio work, Cohen attended art history courses taught by Wittkower. During these years Wittkower was Durning-Lawrence Professor of the History of Art at the University of London, and a member of the Warburg Institute. Cohen acknowledges Wittkower's influence: "Wittkower taught me how to think."\textsuperscript{18} Wittkower imbued Cohen with a set of ideas, in particular, notions about the Italian Renaissance, the importance

\textsuperscript{16}Cohen, telephone interview, 2 February 1991; and Cohen, "Corrections" 5.

\textsuperscript{17}Cohen, "Corrections" 5.

\textsuperscript{18}Cohen, telephone interview, 2 February 1991.
of proportion based in Pythagorean theory, and viewpoints on perspective.\textsuperscript{19} Lawrence Alloway, in the catalogue essay for Cohen's 1959 University of Nottingham "Retrospective" exhibition, points out Cohen's debt to Wittkower. Cohen's "... maturing ability to make decisions about his art and to act on them," can be attributed to the learning that took place in Wittkower's art history courses at the Slade.\textsuperscript{20} Alloway continues, "The nature of these decisions can be seen best by reference to Cohen's interests as a student at the Slade School of Fine Art in the early '50s, when he was much impressed by the art history lectures of Wittkower, and more especially, by his seminars on space. Professor Wittkower characterised space as not merely a gap or a void but as an entity, no less susceptible to being organised than solids."\textsuperscript{21} Wittkower became a role model for Cohen.\textsuperscript{22}

Wittkower, in the article "Interpretation of Visual Symbols," addresses the problem of how "to find out whether and how far the visual symbol in art can yield its meaning to the interpreting beholder."\textsuperscript{23} A representation, notes

\textsuperscript{19}Cohen, telephone interview, 2 February 1991.


\textsuperscript{21}Alloway 3.

\textsuperscript{22}Cohen, telephone interview, 2 February 1991.

Wittkower in his discussion of the term visual symbol, "embodies a concept" and "functions as a symbol . . . ."\(^{24}\) A work of art "is a compound of ideas, concepts, sense messages ordered, adjusted and digested in the artist's mind,"\(^{25}\) and representational meaning can be understood only if "the objects or events shown by the artist belong to the general human experience of the percipient."\(^{26}\) Wittkower's inquiry into how the visual symbol communicates its meaning to the viewer becomes an important investigation for the young Cohen, and this influence is apparent in his works of the 1950s and 1960s and in Cohen's discussion of these works.

**Cohen's Paintings of the 1950s**

A chronologically ordered reassessment of Cohen's paintings of the 1950s provides insight into the relationship of Wittkower's concern with the visual symbol or object communicating meaning and Cohen's continuing engagement with this idea in the structuring of his works. From October 23 through November 22, 1952, he participated in the exhibition "Young Painters," sponsored by the Institute of Contemporary Art, London. The event became

\(^{24}\)Wittkower 174.

\(^{25}\)Wittkower 174.

\(^{26}\)Wittkower 177.
a precedent for annual exhibits introducing budding painters to the London art scene. The 1952 grouping of eight lesser known English artists included also Richard Hamilton and Barbara Braithwaite. Hamilton would become a prominent English modern artist, while Braithwaite would be viewed as an interesting minor figure in the modernist scene. Cohen entered three works in the 1952 exhibition: Family Group, The Power of Healing, and Life Painting. Although the works of the eight painters displayed considerable diversity, the catalogue preface notes three common characteristics. First, the eight artists camouflaged the influences that shaped their styles; second, their works embodied romanticism although they owed little to the English romantic tradition of Blake and Palmer; and third, they built up fairly complex formal structures. A concern with structure in Cohen's earliest post-Slade representational imagery illustrates the continuing effect of Wittkower's stress on complex structure.

From May 10 to 22, 1955, Cohen's paintings Head and Head (In the Window), again works imbued with figurative imagery, were shown in London's Artists International Association (AIA) Gallery exhibition.

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27 Cohen, "Corrections" 5.

28 This analysis is developed in the preface to the four page catalogue of the Young Painters exhibition (London: Institute of Contemporary Art, October 1952) 2.

"Measurement and Proportion." Andrew Forge of the Slade School of Art, and Adrian Heath, the current chairman of the AIA, co-curated the exhibition. That most British artists working between 1933 and 1971 had some association with the AIA is indicative of its importance during that period.\(^{30}\) The purpose of the May 1955 exhibition was "to draw attention to a certain factor in the process of painting, . . . the factor of measurement."\(^{31}\) The artists of the exhibition were "concerned with the precise, measurable relationship of areas and proportions."\(^{32}\) The two Cohen works in this exhibition, building upon a stress on formal structure observed in his three works shown in the "Young Painters" exhibition, are shaped by Wittkower's seminars on space, measurement, and proportion, and the Slade School emphasis on measurement. The Slade stress on measurement had to do with objectivity in observation, differing from Wittkower's interest in proportion as part of the philosophical content of the Renaissance.\(^{33}\)

\(^{30}\) *History of Association* (London: Artists International Association, ca. 1971). Cohen views the AIA differently than the formal recording in the association's history. He reflects, "to the best of my recollection, none of us belonged to the AIA or had any association with it outside of this invitational show. The AIA was typical of the British establishment in latching onto the latest things it wasn't doing itself," in Cohen, "Corrections" 5.


\(^{32}\) Forge 1.

\(^{33}\) Cohen, "Corrections" 6.
In 1957, January-February, and 1958, September-October, the commercial gallery, Gimpel Fils, the most active London gallery exhibiting English avant garde art, invited Cohen to participate in a two person showing. The 1957 exhibition included paintings of Cohen and sculpture of Hubert Dalwood, and in 1958 the focus was the "Recent Paintings by Harold Cohen and Redvers Taylor." The earlier showing included works of Cohen preceding his three year artist-in-residence position at the University of Nottingham from 1956-1959, with an emphasis on the human figure and still life, representational, and situated in classical frame sizes, for example, 24" x 36". A noted difference appeared in the works presented for sale in 1958. The seventeen works offered, with titles of Painting 20, Painting 21, and so forth, all constitute a square, ranging from 25" x 25" to 102" x 102". These were completed during his three year residency at the University of Nottingham. The emphasis on subject matter and size in the first Gimpel Fils exhibition works shifts with the second exhibition to an incorporation of Cohen's exploration of the structuring and ordering of space apparent, in Painting 25 (Thunder Beach) (Plate III) of 1958. The abstract painting is situated on the 68" x 68" square, barely recognizable, relaxed under grid derived from the Renaissance floor, a reference to Wittkower's Slade lectures.

on proportion and space. Soft smudges of paint form vertical stripes, oscillating from light to dark to light, and move vertically across the canvas, giving the idea of "a kind of impression-on-a-grid."

In June of 1958, Lawrence Alloway and Cohen co-curated for The Arts Council of Great Britain an exhibition entitled "Abstract Impressionism." The exhibition concept, initiated and organized by the Department of Fine Art at the University of Nottingham under the administration of Department Head Alastair Smart, brought together recent paintings from Great Britain, France, and the United States with a focus on nature, space, and light. Alloway's introductory comments in the catalogue explain the derivation of the term "Abstract Impressionism," coined by Elaine De Kooning in 1951 at the Arts Club in New York City. Her meaning can be understood from the following quotation:

Retaining the quiet uniform pattern of strokes that spread over the canvas without climax or emphasis, these followers keep the Impressionist manner of looking at a scene but leave out the scene . . . . As the Impressionists attempted to deal with the optical effects of nature, the followers are

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35 Alloway 3-5.
36 Alloway 3.
interested in the optical effects of spiritual states, thereby giving an old style a new subject.\(^3^9\)

For the exhibition Cohen submitted \textit{Happy Day 1} (Plate IV), a painting demonstrating his growing interest in the organization of paint marks and color areas in an atmospheric use of light and space. The Renaissance grid, again a reference to Wittkower's teaching, takes on the structure of a more loosely constructed trellis, on which paint is layered in abstract landscape configurations, emitting a light, whimsical presence.\(^4^0\) Alloway, in the catalogue discussion, noted differing trends of abstract expressionism in both America and in France, and observed that in England there exist cases of both painterly freedom and underlying formality.\(^4^1\) The works of Harold Cohen contain both for in the earlier works space was measured by points and this approach underlies his later work "like a hidden trellis under foliage."\(^4^2\)

In 1959 Cohen completed a three year fellowship in the Department of Art at the University of Nottingham. The Department mounted an exhibition entitled "Harold Cohen Retrospective 1956-1959" to illustrate the successive


\(^4^0\) Alloway, "Some" 4.

\(^4^1\) Alloway, "Some" 4.

\(^4^2\) Alloway, 'Some" 4.
PLATE IV. Harold Cohen, Happy Day 1,
oil on canvas, 43" x 93", 1958.
stages of his development during the three year period. A catalogue accompanied the exhibition in which Lawrence Alloway wrote the introductory essay. Alloway, in his opening comments, spoke of Cohen's study with Wittkower at the Slade, mentioning in particular seminars on space, measurement, and proportion. He continued by noting that Cohen's work split his concern between space and measurement, with works divided into regular grids.

His obsession with tiny squares as symbols of order made him see like a man in a net. However, he recognised the limitations of imposing order on his pictures by the automatic application of a system. This was a habit of formal picture-making not related to his increasing sense of space as a dynamic and unpredictable event.

In the 1957 and 1958 paintings, a series of colourful abstract landscapes, the grid mellows into trellis slats, for example, Garden 2 of 1957 (Plate V) with paint marks and color areas read as space. Underlying the ca. 42" square, however, remains Cohen's analytical approach that directs the works executed from 1956-1959; a linear grid structure filled in with abstract shapes and colored.

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44 Alloway, "Some" 3.

45 Alloway, "Some" 3.

46 Alloway, "Some" 3.
PLATE V. Harold Cohen, Garden 2, oil on canvas, 42" x 42", 1957.
Alloway, in categorizing Cohen's use of space and measurement, referred to the grid of squares that ordered Cohen's paintings through 1956 as "symbols of order." Alloway observed that "soft blurs of paint filled in each square so that the pictures became a kind of impressionism-on-a-grid which led to an ambiguity between the horizontality of the grid and the verticality of the conspicuous paint. His obsession with tiny squares as symbols of order made him see like a man in a net." A review of Cohen's interests as a student under Wittkower, for examples, measurement, proportion, and space, and his use of these in the development of an under grid, indicate a growing concern with the structure of space, rather than only an ordering of space. Thus, the point of the earlier works is Cohen's growing interest in the formation of structure, and a shift in label from Alloway's "symbols of order" to my designation of "symbols of structure" more aptly denotes what he is ordering. Taking a differing viewpoint from Alloway's loosened grid interpretation of the 1957 and 1958 paintings, I contend that the soft trellis structure of Garden 2 and Thunder Beach are a relaxed continuance of earlier, more rigid, grid based paintings.

47 Alloway, "Some" 3.
Although the Wittkowerian grid structure holds in place, the painterly surface loosens as Cohen takes from Sam Francis a liquidity in the use of paint, evident in Garden 2 and Thunder Beach. Cohen was familiar with the paintings of American abstract painter Sam Francis for they both exhibited in the 1958 "Abstract Impressionism" exhibition. Along with the fluid painterly quality of Garden 2 and Thunder Beach is a noticeable development in the use of black to outline. This effect comes from the influence of contemporary British artist Alan Davie who used black to outline the painting surface. This concern reflects a post-war interest in space definition through the use of line reminiscent of Paul Klee’s linear emphasis. Garden 2 and Thunder Beach manifest a fluidity of paint and a black partial linear outline atop the grid structure.

The square based structure, organizing proportion and space, that I refer to as "symbols of structure," originating in Wittkower's teaching and a continuing concern for Cohen following his graduation from the Slade School of Art, is a dominant characteristic of the works in the "Harold Cohen

\[48\text{See Alloway, introduction 4.}\]
\[50\text{Lewis, "British Avant Garde Painting 1945-1956 1," 32.}\]
\[51\text{Alloway, "Some" 4. Cohen spoke about a definite influence of Alan Davie on his paintings of the late 1950s in a February 1989 interview that took place in his studio at the University of California at San Diego.}\]
Retrospective 1956-1959." Alloway commentaries on Cohen along with essays in the Harold Cohen Retrospective 1956-1959 exhibition catalogue substantiate that a directing concern of Cohen's first decade of art making is the underlying structure of the painting. It is also apparent how the influence of his artistic milieu, for examples, Bonnard's painterly use of space that evokes light and atmosphere, Francis's fluid abstractions, and Davie's black outline, affect his use of paint atop the structure, evident in Thunder Beach.

A "Note by the Artist" in the Harold Cohen Retrospective 1956-1959 accompanied the Alloway "Introduction," a "Foreword" by Alastair Smart, a "Biographical Note" on Cohen, and a catalogue listing of the works exhibited. Cohen's statement indicates his concern with ongoing investigation and discovery, and gives insight into his view of what mid-twentieth century art is about.

Though we may well need our humanistic images more than ever, the old ones will not serve; for our needs have changed more in the past hundred and fifty years than in the previous two thousand. Only in the Academies is art reduced to reminiscence, and only there will a past-seeking public find satisfaction. Art is concerned with discovery, and with new experience, not with reminiscence. The essential element in any work of art is that which has never been manifested before, and inevitably, the newness will prove

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53See Alloway, "Some" 3-4; and introduction 3-5.
unacceptable to those who have not followed the artist closely into the unknown. . . . What kind of art is this? It is called abstract, but in fact it is simply non-figurative. The artist has lost interest in the appearance of the world, not in the world itself.\textsuperscript{54}

During the decade of the 1950s Cohen worked through his years of art training at the Slade. On one hand his art moved from figurative representation to abstract landscapes occasioned by his desire to move away from the more classical background of the Slade and find his way in the contemporary scene of avant garde painting.\textsuperscript{55} There was a pull towards New American painting and Abstract Expressionism in particular, represented in the Tate Gallery exhibition "Modern Art in the United States," of January 5-February 12, 1956.\textsuperscript{56} On the other hand, the Wittkowerian grid remained a central component of Cohen's art making, and by the end of the decade

\textsuperscript{54}Harold Cohen, "Note by the Artist," Harold Cohen Retrospective 1956-1959 (London: R. Milward & Sons Ltd., 1959) 6-7.

\textsuperscript{55}Cohen, telephone interview, 2 February 1991.

\textsuperscript{56}See Bowness, "American" 285-292. Bowness chronicles the various showing of American painting in Great Britain. The first major exhibition, "American Painting," showed at the Tate Gallery in June-July, 1946. The second major and more significant exhibition was the Museum of Modern Art's touring show, "Modern Art in the United States," which was presented at the Tate Gallery, January 5 to February 12, 1956. American Abstract Expressionist paintings were located in the last gallery of the Tate and as Bowness relates, "The public reaction to these pictures was, at this stage, one of total incomprehension." Among the unintelligible works were Pollock's NUMBER 1 (1948) and SHE-WOLF (1943), Kline's CHIEF (1950), Still's PAINTING (1951), De Kooning's WOMAN (1950-1952), and Rothko's NUMBER I (1949).
Cohen smoothly fused, on the shallow surface of the canvas, dense, colorful, pastoral landscapes over an almost invisible structuring mathematical grid.

Paintings of the 1960s

In the autumn of 1959 Cohen left London for New York as a Harkness Fellow of the Commonwealth Fund. At this point he was aware of works by American Abstract Expressionist artists through London exhibitions of their work: the 1956 Museum of Modern Art travelling exhibition, the showing of "Some Paintings from the E. J. Power Collection" including works by Pollock, Kline, Rothko, Still, and De Kooning, and works in the "Abstract Impressionism" exhibition.57 There was also Thomas Hess's regular commentary on the American art scene in Art News during the late 1950s. At the time of his London departure he was painting in an Abstract Expressionist idiom.58 Upon his arrival in New York City, he visited the 1959 Museum of Modern Art exhibition entitled "Sixteen Avant-Garde Painters," his fourth

Cohen, telephone interview, 2 February 1991.

direct exposure to American Abstract Expressionist art.\textsuperscript{59} Cohen commented on what he found:

I realised quite suddenly that what we [English modern artists] had bought was an ideal. We had seen too little to be able to distinguish the good from the bad; anything in which the ideal could be seen -- the ideal of free, unfettered action -- was O.K. But in New York it was painfully clear that Abstract Expressionism was an academy, founded on the work of de Kooning and a few others. Where de Kooning had the force and the staying power to eradicate everything from a painting but what he wanted, the academy seemed to me to represent the very apotheosis of self-indulgence.\textsuperscript{60}

Lawrence Alloway, in a 1959 \textit{Studio International} article on "the new American painting," made the distinction between orthodoxy and academism in twentieth century art.\textsuperscript{61} Making an analogy with the function of orthodoxy in science, he observed that it is a group of experts that filter new discoveries and inventions.\textsuperscript{62} In contrast to this flexibility was the rigidity and staidness of academism.\textsuperscript{63} In 1959 Alloway viewed the New York School with its emphasis upon the recurring themes of gesture, surface, and space as

\textsuperscript{59}Cohen, telephone interview, 2 February 1991.

\textsuperscript{60}Richardson 9.


\textsuperscript{62}Alloway, "New" 21.

\textsuperscript{63}Alloway, "New" 21.
orthodox; in 1960 Cohen labeled the group "academic."\textsuperscript{64}

This disenchantment with American Abstract Expressionism led Cohen to reformulate his approach to abstract painting. Paintings from 1960-1965 illustrate this reappraisal.

He felt that he needed a way of cancelling what was unnecessary, rather than of covering it. And the technique he evolved for handling his materials provided the solution. He thought of it as anti-collage rather than collage. The new canvas was cemented in from the back, and the areas to be cancelled were cut away, literally revealing an untouched canvas below. The first relentless reduction resulted in paintings like 	extit{Parkway} (Plate VI). . . . But reduction itself became a minor obsession -- how little could one make a painting of?\textsuperscript{65}

Cohen reduced his paintings to five essential components: figure and ground, open and closed form, insideness and outsideness, repetition, and symmetry. A comparison of 	extit{Garden 2} of 1957 and 	extit{Thunder Beach} of 1959 to 	extit{Parkway} of the spring of 1960 demonstrates his shift.

	extit{Parkway}, of almost square dimensions of 95 x 96", stresses the horizontal axis rather than the left to right vertical dancing rhythm of the two earlier paintings. The grid structure of 	extit{Parkway} is more apparent in the placement of three adjacent rectangular forms along the vertical axis and in the upper half of the painting, atop two long rectangular steps that provide

\textsuperscript{64} Alloway, "New" 21; Richardson 9.

\textsuperscript{65} Richardson 10.
PLATE VI. Harold Cohen, Parkway.
oil on canvas, 95" x 96", 1960.
a heavy horizontal base. The non-figurative landscape of Garden 2 and Thunder Beach, echoing a poetic musical cadence that swings with a vertical rhythm through light and space, is replaced by a heavy, geometric arrangement of more flatly and nuancefully colored rectangular blocks. Parkway is built on Cohen's five basic components: the five rectangles sit on a flat even background. The edges of the rectangles create interior borders. The borders open into illusionary space as the rectangles move off the canvas edges, giving a sense of what is inside the work and what continues outside the canvas. The upper three vertical rectangles balance the two lower horizontal bars. In Cohen's reformulation of painting a new direction emerged to replace the more lyrical abstract landscapes of the late 1950s.

This new direction brought with it not only a renewed concern with the structure of painting but also a consideration of the responsibility of the act of painting, arising from Cohen's friendship with Barnett Newman. In Newman, Cohen found a model who addressed his own sensibilities, a fellow abstract painter stressing a new vision for art that encompasses "a dimension of meaning beyond what a painting stands for, a symbolism higher than the painter symbol. That is the symbolic nature of the act of painting itself." 

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66 See Richardson 10.
These concerns echoed Cohen’s "Note By the Artist" in the *Harold Cohen Retrospective 1956-1959* exhibition catalogue and came to fruition through his involvement with Newman. The responsibility for the act of painting became another dominant concern for Cohen along with his continuing investigation of structure. Under the influence of Newman, Cohen moved towards a uncompromising reduction apparent in *Shinnecock* (Plate VII) of 1960 and similar to Newman’s *Joshua* of 1950. The compositional space has opened up. The implied image, moving beyond the border of the canvas, becomes almost as significant as the image contained within the parameters defined by the canvas. The more unified, impressionistic imagery of the works of 1957-1959 gave way to a sparse, flat, geometric composition where figure and ground took on more equal importance.

In 1961 Cohen returned to London. The strong reductionism of *Shinnecock* shifted to the fuller, more cerebral, horizontal, hard-edged geometry of *Alcide* of 1962. The grid structure again took center stage with beauty in its various reformations through modernity in his search for a new vision of art. "We [Newman’s American contemporaries adhering to a similar viewpoint] are freeing ourselves of the impediments of memory, association, nostalgia, legend, myth, or what have you, that have been devices of Western European painting. Instead of making 'cathedrals' out of Christ, man, and 'life,' we are making it out of ourselves, out of our feelings. The image we produce is the self-evident one of revelation, real and concrete, that can be understood by anyone who will look at it without the nostalgic glasses of history." 53.

⁶⁸Cohen, "Corrections" 7.
the horizon line cutting through the center of the canvas, creating a repeated image in the bordered frame. Cohen discussed the considerations shaping the paintings of the early 1960s, and through his comments, demonstrated a distancing from abstract expressionistic concerns:

For me, painting must come about in response to an outside, not an inside situation. . . . Of course painting refers to the outside world; but in seeing, it sees itself seeing: it records, and records its own act of recording. It makes communication possible, and much of what is communicated is concerned with the mechanics and processes of communication. And where it is most meaningful, it questions profoundly what may be meant by meaning. It is self-analytical, self-critical, and possessed of this finely balanced feed-back system, self-controlling.  

Wittkower's question of how the visual symbol can be communicated to the viewer took on a renewed emphasis in Cohen's art making and Cohen stressed that this activity is embodied in the structure of the work. "The range of meaning available to the artist is largely determined by the semantic structure of the work, and major modifications in meaning can only be accomplished by modifying this structure."

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70Richardson 12.
The painting, *Before the Event* (please refer to Plate II) of 1963, a more compositionally complex arrangement of entirely different shapes than found in *Parkway* or *Shinnecock*, demonstrates Cohen's concern with structure in his use of the five components. The three sections of the triptych contain brightly colored, curvilinear, biomorphic shapes. The assortment of floating geometric forms within the three equivalent columns are precisely bounded by black, brown, grey, or white outlines, a reference to the import of Davie's outline. With the exception of the closed eye configurations on the left, the forms remain open. There is distinction between insideness and outsideness, for example, the curving circuit image of small white squares bordered by opaque brown bands that is located on the left bottom corner in the middle column. The designation of figure and ground is explicit, whether darker figures on a lighter ground or the sole lighter figure on a dark ground in the upper right corner. The bold, flat, expressionistically colored forms painted in primary and secondary subtractive colors, and rendered in both two and three dimensional space, give the appearance of circuits. Cohen reflected:

I had been much concerned with the problem of interpretation, and the paradox it implied. For, though the artist has no way of knowing what the spectator sees in the painting - and the essential differences of genetic structure, environment, predispositions and so on make it quite certain that he will not see the same as the artist sees: nonetheless, there is evidently an act of communion brought about by the painting. . . . Consequently, I tried to form an image of what the mind must be like, and how the perception of a
painting 'fitted in'; and in a seminar paper I suggested, without great originality, the analogy of
the computer. But this particular computer would have its memory bank arrayed on a field, rather
than stored in an index; and while the material in the field, and the interconnections and circuits built
up between the parts would vary from individual to individual, the general pattern of circuit-
building and of incorporating new material would not. What was special about the material in a
painting was that it would not only contain information new to the spectator - absent, that is,
from the field of his mind - but it would also contain information regarding its own incorporation; its own wiring instructions, so to speak.\textsuperscript{71}

\textbf{Before the Event}, purchased by the Tate Gallery in the 1980s, commands a dominant location in a smaller Tate gallery designated for Modern British Art that contains also works by Richard Hamilton, Robyn Denny, and Richard Smith. The location of the work is an indication of the importance of Cohen, and of this work in particular, to Modern British Art.

Cohen’s statement about the painting illustrates its connection, and other Cohen works of the mid-1950s through 1963, with Wittkower’s query of how the visual symbol, the visual object, generates, or yields, meaning to the viewer. Wittkower spoke of a language of visual symbols, and suggested that symbols of humankind can be reduced to essentials understandable by all peoples\textsuperscript{72}, a viewpoint reflected in Cohen’s discussion of \textbf{Before the Event}

\textsuperscript{71}Richardson 14.

\textsuperscript{72}Wittkower 175.
and his analogy of the curvilinear imagery to a general pattern of circuit-building. This general patterning refers to the structuring of the art work. Another noticeable parallel comes forward in Wittkower’s view that if visual signs do not come from a unified concept, then interpretation on the representational level will not occur, again reflected in Cohen’s commentary.73

Cohen’s works, between 1964-1968, continued this focus upon a more obvious grid structure underlying organic abstract arrangements. During these years his questions about meaning, communication, and intentionality became more central to his inquiry.74 In 1966 Cohen produced First Folio (Plate VIII), six 27\textquotedbl square screen prints. The square grid structure of the 1958-1959 works and present in many of his paintings from 1962-1965 persisted. The prints continued as well the delicate linear outlining, or mapping, present in works from the mid-1950s through the mid-1960s. The new element, the dot grid, oscillates in tonal plays of light to dark and back to light. For the first time, Cohen was working the optical play of the light and dark dot, deplete of color, atop the grid, and this emphasis continued through 1968.

73Wittkower 177.

In 1964 Cohen received the prestigious invitation to make an installation for Documenta III in Kassel, Germany. In 1966 he was one of "the British five" selected to represent Great Britain at the XXXIII Venice Biennale. Harold, along with brother Bernard, Denny, Anthony Caro, and Richard Smith were heralded as ambassadors of a new British image. The works of the five, both painting and sculpture, deferred to neither English, French, nor American traditions, but stood on their own originality and merit. Cohen's acceptance, however, by the international visual arts community, distracted little from his inquiry into the nature of his own artistic activity. In a BBC production, "Five for Venice," an interview with the British Venice Biennale participants, Cohen explained that he wished to paint pictures in which "the whole painting is done in one go," with "everything to be determined from the first mark."

With his desire to generate a painting from the first mark, Cohen left behind the emphasis on drawing, central to his French academic training at the Slade School of Art, and a key component of his art making. Edge (Plate IX) of 1967, included in the October 1967 exhibition "Jeunes Peintres Anglais/Jonge Britse Schilders," at the Palais des Beaux-Arts in Brussels,

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76Thompson 233.

77Becky Cohen 2.
exemplifies Cohen's experimentation. Over an unbroken sprayed ground, a
grid of hand painted spot formulations cover the smooth surface. Discussing
the "spotty" paintings in 1968, Cohen noted his attempt to separate line and
color, to move beyond his use of line as outline and then color to fill it in, to
a state "where the painting disappears and just leaves the color."78 Edge
demonstrates this attempt, however, as Morphet notes in the exhibition
catalogue, the grid commands a presence of control with its formal logic
producing "disconcerting sensations of mobility, and of color."79 The
Wittkowerian grid continued its hold over Cohen's inquiry into new methods
for art making.

By 1967 Cohen felt a deep dissatisfaction with the "painting as object
attitude," the mode directing his art making from his training days at the
Slade.80 The traditional landscapes and figures of the early 1950s evolved to
the square impressionistic landscapes at the end of the decade, to Cohen's
reformulation of his approach to geometric abstraction in the early 1960s. His
discontent and experimentation led him to paintings of linear mappings, tonal
dots, and colored spots dissolving linear concerns. All the while the

78Becky Cohen 3.

79R. Morphet, Jeunes Peintres Anglais/Jonge Britse Schilders (Brussels: the
British Council and the Society of Expositions of the Palace of Fine Arts, 1967)
7.

Wittkowerian grid, taking different formulations, along with Cohen's inquiry into structure, meaning, and communication, remained somewhat constant to his art making. In 1967 he visited the Czechoslovakian pavilion at the Montreal Expo, and became excited about the combination of light displays, movies, and slide projectors. He became enamored "with the compositional considerations raised by the multi-projection images which he saw as being foreshadowed by his work and work of some others, for example, Paolozzi.® "One corner of my mind felt, a little grudgingly, that it could have been me doing those displays [in the Czech pavilion]. . . . When the new machines, the even more complex computers, get going next time round, would I want to be in front of them or behind them?"® In the summer of 1968, Cohen moved to California to take up a visiting professorship in the Department of Visual Arts at the University of California, San Diego.

**English Modern Art and English Abstract Expressionism**

American Abstract Expressionism formed a dominant source for the later development of abstract expressionist painting in Great Britain, and in particular, its ideas about art making impact the work of Harold Cohen.

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® Cohen, "Corrections" 7.

Unlike its successor, English Abstract Expressionism has not received the attention of the American movement. This is due in part to its derivation from American influences, the small number of English artists working in the mode, and its short duration, lasting from the early 1950s to the early 1960s. In the current reassessment of modernism, American Abstract Expressionism represents a major later stage of modernism, and what is often referred to as the triumph of American painting. The American formulation, holding a dominant position in modern art, is captured in two texts, Irving Sandler's *The Triumph of American Painting: A History of Abstract Expressionism*, now viewed as a classic, and the Albright-Knox Art Gallery exhibition catalogue entitled *Abstract Expressionism: The Critical Developments* that accompanied a primary retrospective of the movement held at the gallery in 1987 for its 125th year celebration.

Although American Abstract Expressionism provided a leading impetus for the English development and was decisively formative in the work of Bernard Cohen and Harold Cohen, Robyn Denny, and John Hoyland, the basis of the English formation is different. Modernism in Great Britain, in its

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85 Morphet 2.
search for a conscious theoretical foundation, established an awareness that English art was no longer inferior to French art. Five modern strands underlie English modernism, and subsequently the development of English Abstract Expressionism.

The first is abstract art, present on the continent during the early decades of the twentieth century. The work of Henri Matisse, Pablo Picasso, Pierre Bonnard, Paul Cezanne, and Piet Mondrian caught the interest of the London art community. In 1933, Ben Nicholson and Barbara Hepworth aligned themselves with the Paris based "Abstraction-Création," a society dedicated to non-figurative art. At this time, political unease in both the Soviet Union and Germany forced abstract and experimental artists to search for safer terrain. These emigres by-passed the Parisian art scene and sought refuge in Great Britain. In 1934 architect Walter Gropius and designer Marcel Breuer arrived in England, followed in 1935 by Laszlo Moholy-Nagy, in 1936 by the Russian Constructivist Naum Gabo, and in 1938 by Piet Mondrian. In 1936 the exhibition "Abstract and Concrete" held at Oxford, Liverpool, Cambridge, and London, included British artists Hepworth, Nicholson, Henry

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86Spalding 107.
87Alloway, "Some" 3; and Bowness, "American" 287.
88Spalding 110.
89Spalding 112.
Moore, and European artists Mondrian, Moholy-Nagy, Fernand Leger, Joan Miro, Alexander Calder, and Gabo.\textsuperscript{90} The idea directing much of this abstract art is one that lies behind the Wittkowerian thinking that affected Cohen as an art student, and that is, "... the Platonic belief that formal relationships reflected a metaphysical ideal; that the simplicity and clarity of means pointed to an underlying model of construction reflective of some larger vision of social organization."\textsuperscript{91} Although the Second World War isolated Great Britain from artistic activity in France and the further impact of abstract art, thereby pressing British modern artists to a more independent avant garde development after 1945, at war's end ties were re-established with France.\textsuperscript{92}

Constructivism played an important role in English modernism. Leading European architects, designers, and artists sought in their work "a new cultural unity," in which lines, colors, and shapes were integral with human emotions, thus enriching life.\textsuperscript{93} This view encouraged artists to work in relation to the environment and was reflected in works of Hepworth and Moore.\textsuperscript{94} The Constructivists pursued a 'strategy of purity' that rejected external imagery and tended toward "a rigorously systematic, often

\textsuperscript{90}Spalding 112.
\textsuperscript{91}Spalding 112.
\textsuperscript{92}Lewis, "British Avant Garde Painting 1 1945-1956," 25.
\textsuperscript{93}Spalding 113, 115.
\textsuperscript{94}Spalding 115.
mathematical mode of operation. In practice, Constructivism formed an architecture of modular units and reflected the designer's attempt to meet human needs. This Constructivism had little impact on Cohen.

Neo-romanticism of the "St. Ives school," arising from a freeing up of the English landscape tradition, played a dominant role in English modernism. The group took its name from the St. Ives peninsula in Cornwall, a location artists had frequented since the late 1800s. Famous for its beauty, the southern seashore English village was known for its light that reflected off its three seasides. The purpose of the diverse group of the British avant garde was to work out a dialogue between abstraction and landscape. Along with this objective, more emphasis was placed on the internal activities of the artist's feeling and encounter with materials, a parallel with American Abstract Expressionism. Gabo, Hepworth, and Nicholson with Constructivist interests, along with Alan Davie, Terry Frost, Patrick Heron, and Peter Lanyon, are noted British artists who comprised the St. Ives group. Early works of Cohen, rendered in the 1950s, for examples Garden 2 and Thunder Beach, incorporate the interests of the St. Ives school.

96 Spalding 115.
97 Spalding 171.
98 Spalding 172.
99 Spalding 171-172.
Along with the developments of abstract art, abstracted landscape, and Constructivist art in England came Surrealism. Max Ernst, Miro, and Salvador Dali exhibited in London in 1936. The Surrealists played with imagination, juxtaposing combinations to cause disordered logic, in achieving the "marvelous." Dali represented the most celebrated figure of Surrealism in Great Britain during the 1930s. Surrealism did not influence Cohen's art making; neither did the work of Dali nor the strand of surrealism that developed in American Abstract Expressionism and present in the paintings of Jackson Pollock. Cohen's years of study under Coldstream at the Slade School of Art gave him a stronger preference for realism than surrealism.

The importation of Abstract Expressionism into Great Britain from America had a strong affect on the development of English modernism. Works of the American Abstract Expressionists were first seen in London in 1953 when examples of the so-called "action painting" were shown at the Institute of Contemporary Arts exhibition "Opposing Forces." Young English artists were reading about the avant grade Americans in art journals with modernist formalist theory expounded by Clement Greenberg and

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100 Spalding 116.
101 Spalding 115-117.
102 Bowness, "American" 289.
Harold Rosenberg. The ideas of the American art scene were imported into Great Britain through journal articles and photographic reproductions, and the notions of the New York School were championed by London art critic Lawrence Alloway. He took a prominent role in shaping young English artists beginning their study in London art schools. This was the case with Harold Cohen.

Harold Cohen paid more attention to those developments in Modern English Art that focused on abstraction. Through the St. Ives school, the English avant garde developed its own view of abstraction, joining the continental concern for abstraction with a modernized interpretation of the English landscape tradition. In addition, American Abstract Expressionism caught the attention of young, post-war English artists, offering further possibilities beyond the current views about abstraction and abstracted landscape. Cohen looked to both of these groups in his art making, along with Newman's concerns of uncompromising reduction and for "a dimension of meaning beyond what a painting stands for."

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105 Richardson 10-12; Cohen, "Corrections" 7-8.
Cohen Amid the Modern English Artists

Alan Bowness, director of the Tate Gallery, writing in 1967 for Studio International, presents a three stage framework to illustrate the relationship of English artists to American Abstract Expressionism. Bowness uses chronology as a criterion to locate artists and developments. His first stage, The Older Painters, includes painters over the age of 45 years at the time of the Museum of Modern Art's touring exhibition when "Modern Art in the United States" visited the Tate Gallery from January 5 to February 12, 1956. Francis Bacon opposed abstract painting; Ben Nicholson, sympathetic to action painting was aware of the less than revolutionary qualities of the paintings; and Victor Pasmore, a Constructivist, just had other concerns. The Middle Generation, those between 30 and 45 years of age, included Heron, Frost, Roger Hilton, and Bryan Wynter. Aware of the years lost during World War II, these artists faced American Abstract Expressionists head on and were the first Europeans to come to terms with the imported movement. Bowness's third group, Young Painters, under 30 years of age,

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106 Bowness, "American" 290-292.
109 Bowness, "American" 290.
placed Cohen with his contemporaries, brother Bernard, Denny, Richard Smith, Ralph Rumney, Henry Mundy, John Hoyland, Gwyther Irwin, and Gillian Ayers as the young British painters interested in new, large scale, non-referential abstraction following the American example. These concerns linked the Young Painters to American Abstract Expressionism.

**Similar Concepts -- Cohen and the English Abstract Expressionist**

To illuminate the factors that led Cohen towards abstraction in the mid-1950s and a focused exploration of abstract expressionist painting from 1959-1968, I will discuss the ideas he held in common with both English and American abstract expressionistic painters. Cohen's early identification with abstract expressionism has its background in the development of modern art in Great Britain. Thus, it is important in an analysis of Cohen's development to differentiate between American and English Abstract Expressionism, and to recognize that the American version was one of several influences on the British development. Hence, it is important to examine the British art scene during this period to gain insight into the evolution of English Abstract Expressionism that affected Cohen's art making.

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110 Bowness, "American" 292; and Spalding 189.
Patrick Heron's reaction to the 1956 Tate exhibition captures the British modernist's response to American Abstract Expressionism:

I was instantly elated by the size, energy, originality, economy and inventive daring of many of the paintings. Their creative emptiness represented a radical discovery, I felt, as did their flatness, or rather their spatial shallowness. I was fascinated by their consistent denial of illusionistic depth. . . . I would like to end by insisting that to me and to those English painters with whom I associate, your new school comes as the most vigorous movement we have seen since the war . . . . We shall now watch New York as eagerly as Paris for new developments.  

Besides the occasional writings of the artists, London critic Lawrence Alloway's commentaries provide a more consistent appraisal of the English development. Alloway conveys the ideas and attitudes common to the English Abstract Expressionists. In a recent interview with Michael Auping, Alloway spoke of the English development. His comments underscore the painterly concerns of the British artists, provide a background for understanding Cohen's attraction to abstract expressionism, and encourage the classification of Cohen as an English field painter.

111Patrick Heron, "Americans at the Tate Gallery; Abstract Expressionists the Most Provocative," Arts 30 (1956): 15-17.

112See Auping's interview 124-135, included in the catalogue for the 1987 major retrospective on American Abstract Expressionism held at the Albright-Knox Gallery, Buffalo, New York.
Alloway's remarks provide at least three indications that Cohen ought to be classified as a field painter. Alloway makes a clear distinction between the two groups comprising American Abstract Expressionism: the gesture painters, for example, Pollock, and the field painters, Newman, Rothko, and Still.\textsuperscript{113} He connects the English direction more strongly with field painting, noting that the term "field" suggests an image of artificial infinity, is nonhierarchical, and assumes a worldview that has a content, and these were concerns as well of the English painters.\textsuperscript{114} Further, Alloway views "the field of the painting as a realm of potential meaning," with the concept of the surface viewed as a unified whole.\textsuperscript{115} Cohen's works Tribune (please refer to Plate I) of 1962 and Before the Event of 1963, in which the range of meaning is "determined by the semantic structure of the work," fit under Alloway's classification.\textsuperscript{116}

Further, Alloway sees in the works of Still, Newman, and Rothko a reduction of elements, but not a reduction in meaning.\textsuperscript{117} In Cohen's reaction against the academizing of American Abstract Expressionism, he limits his work to five essential elements, following an emphasis on reduction

\begin{itemize}
  \item \textsuperscript{113}Auping 129.
  \item \textsuperscript{114}Auping 129.
  \item \textsuperscript{115}Auping 135.
  \item \textsuperscript{116}Richardson 12.
  \item \textsuperscript{117}Auping 133.
\end{itemize}
initiated by Still, Newman and Rothko. Still, Newman, and Cohen prolifcally discuss why they chose to reduce their works to certain elements for field painting which required more verbal justification than did gesture painting with its link to the manual tradition of painting.

In addition, Alloway's comments dealing with field painting lay out the co-ordinates of the British field painters. There was no appeal to strict geometry, observed in a ruffle of the straight line. The works tended toward ambiguity. The nature of paint on the surface was given emphasis, although the surface remained flat. The field painters established the large scale mural, for example, Barnett Newman's famous mural painting Vir Heroicus Sublimis of 1950-1951 and measuring 7'11 3/8" x 17' 9 1/4". Similar points of reference are evident in Cohen's works from 1960-1965, even to the Newmanish lines and zippers that can be recognized in Before the Event.

American Abstract Expressionist scholar Ann Gibson provides a further connection of Cohen to both English and American Abstract Expressionism. Writing in the 1987 exhibition catalogue of the Albright-Knox retrospective, Gibson argues that certain agencies of meaning: symbol, metaphor, icon,

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118 Richardson 11, 14. See Cohen's discussion of the use of his five essential elements in Alcide and Before the Event. See also Auping 133.

119 See Auping 133-134; and Richardson 9-16.

120 Auping 135.

121 See Richardson 14.
mystic oxymoron, and narrative allegory, were employed by the Abstract Expressionists. She observes that "one can identify these devices with the status of referring in an artist's work--with the manner in which the visible are linked to meaning. It is important to note that the use of these strategies usually developed gradually, as an artist's employment of one merged into the next." Differing Abstract Expressionist artists employed some, and possibly all, of the devices. Gibson points out that by the 1940s symbol was the most frequently mentioned figural device referred to by abstract expressionist artists, and symbol was conceived as an element for something beyond itself.

An alignment of Gibson's category of symbol of meaning and Cohen's symbol of structure makes clear what it is that Cohen is addressing in his painting.

The range of meaning to the artist is largely determined by the semantic structure of the work, and major modifications in meaning can only be accomplished by modifying this structure. If I use a dotted line to indicate "cut here" in a context where the instruction is reasonable and non-contradictory, then the meaning is unambiguous. If I use the same mark, with the same instructional

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123 Gibson 65.

124 Gibson 65.
associations, but either by modifying the context, or by any other means make it clear that the same meaning in not intended, then another dimension becomes available. . . I suspect that unlike objects, the marks which are the raw material of painting have no normal context. They have only what the painter gives them. I am talking about the manipulation of expectations which do not exist, but have been built up in that same painting. 125

Cohen's idea about meaningfulness communicated, or generated, in the structure of the image and captured in Gibson's symbol category of meaning, provides a prominent link between his early works and his abstract expressionist works, and with concerns of both British and American abstract expressionist painters. In the introduction to a 1963 exhibition at the Robert Fraser Gallery, London, Cohen explains that he is concerned with the mechanics and processes of communication, and that symbol in painting is "something which stands for something else."126

For Cohen, argued Richardson, "the conveying of meaning and the investigation of ways in which meaning may be conveyed are two interdependent and intertwined aspects of the same activity."127 Cohen's own statements, reflecting his dominant interest with symbols of structure that communicate or generate meaning to the viewer, captured a main concern that

125Richardson 12-13.
126Cohen 1.
127Richardson 12.
originates in Wittkower's teaching. A review of Wittkower's inquiry recalls his stress that a visual representation embodies a concept and functions as a symbol, and Wittkower asks how that visual symbol communicates meaning to the viewer?\textsuperscript{128} Cohen takes over Wittkower's query, and this investigation provided a focus of Cohen's art making as a modernist abstract painter.

Conclusion

During the first two decades of his art making, Harold Cohen became world renowned for his abstract expressionist field paintings. During his years at the Slade School of Art a major concern of his teacher Rudolph Wittkower came to dominate Cohen's thinking. Wittkower was interested in discovering how visual symbols in art yield meaning to the viewer. Cohen took up this inquiry. His paintings of the 1950s and 1960s illustrate his investigation of visual structure, which in turn lead to his query of how visual structure communicates, that is generates, meaning. His experimentation with painting, ranging from figurative still life to abstract landscape to abstract field paintings, however, did not satisfy this investigation because he was learning

\textsuperscript{128}Wittkower 174-177.
nothing new.\textsuperscript{129} Chapter Three discusses Cohen's move to California in 1968 and his new start with the computer as he continued his exploration of how visual structure yields, that is generates, meaning to the viewer.

\textsuperscript{129}See Becky Cohen 4; and Harold Cohen, personal interview, 17 November 1986, 17.
CHAPTER III

COHEN THE COMPUTER ARTIST

In 1968 Cohen accepted a one-year visiting professorship in the Department of Visual Arts at the University of California at San Diego. At the end of the first year he was invited to chair the Department of Visual Arts, an invitation that lead him to question returning to England. Cohen chose to remain in California for his relative anonymity in this environment released him from restrictions he felt in London’s art world. In this different milieu he began to try new things in his art making and within weeks of his arrival he was introduced to the computer, an involvement that changed his approach to art making. I will discuss Cohen's move to California, his introduction to the computer, and the considerations that lead him to adopt the computer for further exploration in art making. I will also present a short sketch of the

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1Becky Cohen 4.
2Becky Cohen 4.
artificial intelligence position that instructs Cohen's use of the computer. Then I will examine Cohen's computer generated imagery from 1973 through the present, showing how the software program AARON assists Cohen's quest to discover how visual structure begets, that is, yields meaning to the viewer. Finally, I will locate Cohen's place in the newly developing area of computer related art.

Cohen, California, and the Computer

In the summer of 1968 Cohen moved to California to take up his new position as visiting lecturer in the Visual Arts at the invitation of the Department Chair Paul Brach. Cohen had met Brach, also a painter, during his stay in New York in 1959-1961. Brach introduced Cohen to a graduate student in the music department who was going around teaching people computer programming. The student offered to teach Cohen. The music student tutored Cohen for six weeks and then left Cohen to his own resources. Cohen recalls this initial introduction:

. . . my first contact with computing was completely arbitrary. It was never sought. At this point in my life I was not happy with the way my work was going. I had the feeling that there were more interesting things happening outside the studio than happening inside. . . It just happened

\[^{3}\text{Harold Cohen, personal interview, 17 November 1986, 9.}\]
that when I came to San Diego [the University of California] the then chairman of the Art Department introduced me to a graduate student in the music department who was going around teaching people programming and he said he would teach me to program and I agreed.\footnote{Cohen, personal interview, 17 November 1986, 9-10.}

Cohen continued learning how to program and it occurred to him that the computer could be used to investigate his art making interests.

The difficulty for me as a painter, not that I knew it to be a difficulty at that time, but certainly what led me into computing was a significant level of frustration with the fact that I had been painting for twenty years and it seemed that I did not know anything more about painting than when I started. . . . It had to do specifically with notions of representation in the very broad sense of making marks that other people believed to have meaning, "stand-for" things. After all those years it did not seem to me that I was approaching anything like a theory of representation. . . . Using the computer allows for a different kind of externalizing to anything I had before, and consequently opened the way to a completely new set of perceptions. But essentially what is at stake is that changing internal model, the way the modality with which we externalize and represent [functions], so that we can look at it and find out what we need to find out in order to verify, deny, the validity of our beliefs.\footnote{Cohen, personal interview, 17 November 1986, 18-19.}
Along with Cohen's own dissatisfaction concerning his painting, his wife and collaborator, Becky, observed his discontentment with the London art world and with his painting. Accompanying his fame came a loss of freedom. He found in California an anonymity that gave him more space to work. Becky Cohen notes "that somehow he wasn't learning enough going to his studio everyday and putting paint on canvas. It was a time for change." It took almost a year of programming before he realized that the computer could be used "to grapple with the most deep-seated concerns in his own work."

In the early 1970s Cohen began experimentation with the computer. With three years of programming experience he applied for funding to the National Science Foundation. Although his request was denied, Edward Feigenbaum, a referee of the application for the NSF, recognized in Cohen's grant application an approach to artificial intelligence similar to his own. He contacted Cohen, indicating interest in Cohen's work. Cohen met with Feigenbaum regularly during 1973 to discuss what he was doing. He reflects upon this working relationship.

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6Becky Cohen 4.
7Becky Cohen 5.
8Becky Cohen 5.
9Cohen, "Corrections" 9.
I discovered eventually that I was not alone in my attitudes, though my co-believers were not in the art world. Under the guidance of Professor Ed Feigenbaum, of Stanford, I learned how the artificial intelligence community went about its business, and started again, with more knowledge and more direction than I had in the beginning, to write programs which would, in some important respects, do what human artists do when they make images.\textsuperscript{10}

Also in 1973, Cohen was introduced to petroglyphs in California's Chalphant Valley. These small images or signs were pecked into rock surfaces.\textsuperscript{11} The similarity of the imagery, between aboriginal ancestors of today's American Indians spanning 10,000 years and other pecked stone imagery by human beings all over the world, suggested to Cohen the possibility of a "set of perceptual constants in the human brain."\textsuperscript{12} A deepening understanding that computers follow rule sets, along with his observations of the California petroglyphs, lead him to consider similarities and differences of the rule-based computer program to a set of perceptual constants in the human mind. These ideas he discussed with Feigenbaum.

In conversations Feigenbaum mentioned Herbert Simon, who along with Allen Newell, was instrumental in the development of the physical symbol system approach to artificial intelligence. Cohen became interested in

\textsuperscript{10}Cohen, personal interview, 17 November 1986, 9.

\textsuperscript{11}Becky Cohen 6.

\textsuperscript{12}Becky Cohen 6.
this approach and adopted it for his own experimentation. Before proceeding
to Cohen's application of artificial intelligence to art making in an attempt to
model in the computer what human artists do when they make images, let us
review briefly the development of artificial intelligence.

Artificial Intelligence

A modern return to the question of "What are minds and how do they
work?" has lead to the new study fields of artificial intelligence and cognitive
science. During the fall of 1955 the idea of artificial intelligence using general
symbol manipulators was invented by the threesome of Allen Newell, Cliff
Shaw, and Herbert Simon. The difference between their work and earlier
developments in Cybernetics and machine translation was a focus on thinking,
and specifically problem solving. In 1956 ten young scholars trained in
mathematics and logic, including John McCarthy, Marvin Minsky, Newell, and
Simon, met at Dartmouth College in New Hampshire to debate the
possibilities of producing programs that could think and behave
intelligently. In a Rockefeller Foundation grant application they stated their

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For a fuller discussion see John Haugeland, Artificial Intelligence: The

Howard Gardner, The Mind's New Science (New York: Basic Books,
1985) 50.
intention:

The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.\textsuperscript{15}

On this premise ideas expanding the field of artificial intelligence continue to unfold.

Newell and Simon, in landmark research on the perceptual abilities of chess masters, found that the storage of a single symbol functions as a single unit or as a cluster.\textsuperscript{16} The idea of cluster, or chunk, with the possibility of differing sizes of chunks, became the defining unit of the knowledge base. Thus, master chess players function with larger size chunks in their knowledge base. This knowledge-competence dimension of the work of Simon and Newell, linked to the early history of the study of expertise, contributes to the development of expert systems in artificial intelligence.

In 1974 Minsky and Seymour Papert recognized that the search process in intelligent programs needed a highly-organized structure of specific knowledge to solve problems in complex knowledge domains. To resolve this problem they studied ways of incorporating such specific knowledge into a

\textsuperscript{15}Pamela McCorduck, \textit{Machines Who Think} (San Francisco: W. H. Freeman, 1979) 93.

computerized knowledge-base. This development formed the basis for the building of AI expert systems: systems dependent on the idea that a domain of expertise may be treated as a micro-world, at least with regard to certain decision-making purposes.\textsuperscript{17}

With the growth of artificial intelligence have come differing viewpoints. In the early 1980s philosopher John Searle coined the terms "strong AI" and "weak AI" to differentiate between the two dominant positions.

According to weak AI, the principal value of the computer in the study of mind is that it gives us a powerful tool. For example, it enables us to formulate and test hypotheses in a more rigorous and precise fashion. But according to strong AI, the computer is not merely a tool in the study of the mind; rather, the appropriately programmed computer IS a mind, in the sense that computers given the right programs can be literally said to UNDERSTAND and have other cognitive states. In strong AI, because the programmed computer has cognitive states, the programs are not mere tools that enable us to test psychological explanations; rather, the programs are themselves the explanations.\textsuperscript{18}

The strong AI designation categorizes the work of Herbert Simon, his former student Ed Feigenbaum, and Cohen. Cohen so fully adopted Simon’s position that it permeated all his thinking regarding his use of the computer for art.

\textsuperscript{17}Haugeland 193.

The current AI debate centers on two camps that have existed from the beginning years. The physical symbol system approach, also called the representational symbol system approach, incorporates both "strong AI" and "weak AI" viewpoints. The Newell/Simon "strong AI" position falls in this first grouping that is often referred to as the traditional variety.\(^{(16)}\) This viewpoint holds that both minds and digital computers are physical symbol systems, with means to facilitate general intelligent action.\(^{(20)}\) This approach has dominated the development of AI through most of its brief history. Harold Cohen follows this viewpoint. A second grouping, led by Frank Rosenblatt and working from the viewpoint of holistic neuroscience, looks to a connected network to simulate the interaction of neurons.\(^{(21)}\) Although the approach of both groups met with immediate but limited success, the physical symbol system hypothesis initially governed artificial intelligence. In recent years the neural net, or connectionist strategy, has taken a stronger position in AI research and has not emphasized the differentiation of "strong AI" and


\(^{(20)}\) Boden 7.

\(^{(21)}\) Dreyfus and Dreyfus 16.
"weak AI." Connectionism seems more suited to some areas of modeling cognition such as vision and speech understanding. Although the representational symbol system approach has lost favour because of its inability to solve seemingly easy problems, for example, the lack of arguably intelligent machines, and its philosophical rationalist basis has come under copious attack, Cohen's alignment to the physical symbol system approach remains. He has acknowledged, however, in the past few years that if neural computing could resolve the intractable problems that he is finding, then he would alter approaches. So far there is no evidence that the neural approach can resolve his computing difficulties.

Using Simon's strong AI approach in conjunction with the computer has enabled Cohen to begin building a theory of representation that he spoke about in 1968. His work is directed at building a theory of representation that deals with the making of marks that other people would perceive to have

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23 Haugeland 250.


meaning, that is "the nature of image-mediated transactions."^27 Fascinated by Wittkower's inquiry to discover how the visual symbol can give over its meaning to the interpreting beholder, Cohen began his journey to locate how visual structure in his painting begets meaning to the viewer. He continued, through the physical symbol system of the computer, his inquiry to locate a structure for visual representation. Cohen hypothesized "that the structure of all drawn images, derives from the nature of visual cognition."^28

To work out this hypothesis, Cohen developed in 1973 the software program AARON, an artificially intelligent, expert system, rule-based, art maker to investigate the cognitive principles that underlie visual representation. In order to understand AARON's composition, let us review the terms describing his program. AARON embodies the concept of strong AI as explained in Searle's definition. Herbert Simon, in an introductory catalogue essay to the 1984 Harold Cohen: Computer-As-Artist exhibition explains, "Clearly, the computer is the artist; it does the drawing, its activities guided and determined by the program that lies in its memory (just as human artists' knowledge and skills lie in their memories.)"^29 AARON is a symbolic expert system, indicating that it possesses a knowledge-based program. To

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27Cohen, "What" 1028.
28Cohen, "What" 1028.
29Simon 15.
implement a knowledge-base, Cohen had to portray what the artist needs to know about the world and about representation in order to make a representation of it. AARON's current knowledge-based program models Harold Cohen's knowledge-base for drawing as a computer simulation of his cognitive process, and includes object specific knowledge of people and how they move, and knowledge of plant morphology. Thus, AARON makes freehand drawings of people in garden like settings. Cohen is presently attempting to give AARON a knowledge-base incorporating his painting process and his application of color.

AARON functions as a rule-based program "in which certain fundamental rule-sets are bound to low-level cognitive processes" and models aspects of Cohen's image-making behavior through the action of the rules. Thus, a rule-based program, such as AARON, uses a body of rules to represent expertise. A rule consists of two parts: the IF part consists of a list of conditions, and the THEN part consists of a list of actions. A rule-based program proceeds by finding a rule that has its conditions met and carries out its actions. Each time a rule is carried out, new conditions arise, and another

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31 Cohen, "What" 1028; and "How" 846.
33 Cohen, "What" 1028.
rule will apply. Here is an example of one of Cohen's rules:

If (this is a first development
and the last figure was open
and at least n figures have been done
and at least q of them were open
and at least t units of space are now available)
Then
This figure will be closed
specifications for repetition
specifications for configuration
to move on from this point:
If (this is a second development
and the first was closed
and its properties were
  a. (size)
  b. (proportions)
  c. (complexity)
  d. (proximity to . . . )
Then either [and so forth]34

AARON serves Cohen's investigation in differing ways. The program serves as a research tool to expand Cohen's expert knowledge, rather than to capture that knowledge for the use of others.35 Second, AARON's role is one of investigation, "to serve as a functional model for a developing theory of visual representation."36 Lastly, the goal of the AARON program "is to discover how representational structures represent what they represent: how

34Cohen, "What" 1041.
35Cohen, "How" 847.
36Cohen, "How" 848.
we use what we know to build those structures.\textsuperscript{37}

The starting point of Cohen's working hypothesis was that all image-making and image-reading "is mediated by cognitive processes of a rather low-level kind," processes that enable us to cope with the real world.\textsuperscript{38} Along with the acknowledgment of the absence of common cultural agreements, these processes unite the image-maker and the image-viewer in a single exchange.\textsuperscript{39} Cohen proposes that "the intended meanings of the maker play only a relatively small part in the sense of meaningfulness. That sense of meaningfulness is generated for us by the structure of the image rather than by its content. . . . The sense of meaningfulness must be generated through non-cultural commonalities between mark-maker and mark reader," and these non-cultural commonalities reside in the cognitive system.\textsuperscript{40} Program AARON is the vehicle for Cohen's working hypothesis and provides an avenue situated in artificial intelligence to investigate Wittkower's question of how the visual symbols of art can yield meaning to the viewer.

\textsuperscript{37}Cohen, "How" 850.

\textsuperscript{38}Cohen, "What" 1039.

\textsuperscript{39}Cohen, "What" 1039.

\textsuperscript{40}Cohen, "What" 1939; and "Implementing" 16-17.
Drawing Machine AARON

For the last two decades it has been through the software program AARON that Harold Cohen continued his art making. A review of the stages of AARON's development and the imagery produced will provide an overview of Cohen's computer generated imagery and insight into how he tackled the investigation into how structure generates meaning.

AARON's toddler years were preoccupied with a puzzle that had plagued Cohen for a long time: "how it is that we were able to make sense of systems of marks generated within cultures utterly remote from our own, the cultural meaning of which we could not possibly know. For that matter, how are we able to make sense of any marks at all?" In these early years AARON's knowledge-based program knew something about processes of human cognition and about drawing, evident in the 1979 mural for the San Francisco Museum of Modern Art (Plate X). "The program thus succeeded in demonstrating [in drawing the San Francisco mural] the power of the cognitive system itself, devoid of world knowledge: and by implication, the

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42Cohen, "Implementing" 16.

43Cohen, "Implementing" 17.
degree to which all ('visual') representational systems take both form and power from the cognitive system."^44

At this stage, Cohen incorporated into AARON's art making knowledge-base three of the five essential components that resulted from his reduction of painting and are present in ALL images. These components, relabelled cognitive skills, included:

1. the ability to differentiate between figure and ground,
2. the ability to differentiate between open and closed forms, and
3. the ability to differentiate between insideness and outsideness.\(^45\)

A hierarchical ordering (see Appendix A) governed the computer programming, working from lower levels of mapping and planning to higher levels of lines, sectors, and curves with each level responsible for its own decision making.\(^46\) Of course, the imagery of the San Francisco mural does not provide a visual illustration of the embedded coding directing the hierarchical computer process, however, one sees the delineations of figure/ground in the hand colored geometric shapes and linear patterns sitting atop the white ground of the wall. Closed geometric forms juxtaposed to open linear waves and cross-hatching differentiate open and closed form.

\(^{44}\)Cohen, "Implementing" 18.

\(^{45}\)Cohen, "What" 1040.

\(^{46}\)Cohen, "What" 1040.
Boldly colored interiors and colored edged exteriors illustrate the working of insideness and outsideness. A comparison of the San Francisco mural and Blossom (Plate XI) of 1964 illustrates strong similarities between the Cohen abstract painting and the early computer generated drawing. In both works Cohen emphasized the three essential components of figure/ground, open/closed form, and insideness and outsideness. Both images appear to be drawings that are coloured in. The AARON drawing, however, includes linear wave patterns not present in the 1964 painting. Although the computer generated image is easily accessible to the viewer, a consistent problem in the analysis of AARON's activity is our inability to view AARON's algorithmic (numerical sequential ordering) computer processing. The tension between the invisibility to the viewer of AARON's program and its structuring of imagery, and a completed AARON image, highly visible to the viewer, remains constant. Cohen's, and thus AARON's, main concerns deal with the structuring of visual imagery, a process not readily available to the viewer "as is the thinking of the human artist."47

Sometime in 1979, the young AARON began a second stage of the child-like process of scribbling that developed into a "scribble and surround" mode and became the sole structuring format for his closed forms.48

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47 Cohen, "Corrections" 10.
48 Cohen, "Implementing" 19-21.
PLATE XI. Harold Cohen, Blossom, acrylic on canvas, 102" x 102", 1964.
developing the complex simulation of a child scribbling, it occurred to Cohen that he had stumbled upon a child's "first attempt at representation: the first manifestation of that characteristic ability of the human mind, to make something stand for something else." Along with this development, it became clear to Cohen that AARON's knowledge-base needed a continual input of knowledge of structure rather than knowledge of appearance. This meant placing within AARON a model, for example, an animal structure, rather than the appearance of an animal in the external world. Cohen produced simple box-like cores to simulate animals's bodies, and the drawings suggested a likeness to Northern European Paleolithic art. He also recognized that in the building of scribble and surround closed forms, simulating what young children do, that drawing is integral with cognition, and the closed form is common to all visual representation systems. The Tate Gallery mural of 1983 (Plate XII) and the Ontario Science Centre mural of 1984 are good illustrations of AARON's scribble and surround structuring mode. It can be noted as well that these two murals have a similar organic structure to Before the Event of 1963 and Blossom of 1964. All four works are linear drawings filled with color; they incorporate the three cognitive

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49 Cohen, "Implementing" 19.
50 Cohen, "Implementing" 20.
51 Cohen, "Implementing" 21.
PLATE XII. Harold Cohen, Untitled, computer generated drawing, acrylic on cotton, hand painted, 14' x 60', 1983, Tate Gallery, London.
components; and each is comprised of large, flat, floating organic shapes.

In the mid 1980s it became apparent to Cohen that he needed to provide AARON with explicit knowledge of the objects that he appeared to be drawing, that is, knowledge of rocks, plants, trees, and the human figure. This addition, comprising a third stage of AARON's development, occurred in the early teen years and is apparent in drawings of 1985 (Plate XIII). AARON drew a human type figure by constructing a large closed middle form, a smaller closed form atop, two smaller appendages adjoining the midsection of the middle form, and two forms hanging from its bottom.\(^{52}\) A sense of distance in perspective also developed, for things located farther away were smaller and higher up, whereas the closer items were larger and to the bottom of the drawing.\(^{53}\) Thus, by his teen years, AARON's expanding knowledge base contained drawing skills and basic information about nature and the human figure.

By the mid 1980s AARON's compiled code took up about a half a megabyte on a VAX-750.\(^{54}\) Along with the compiled code, AARON's configuration included a data structure built "to represent the developing

\(^{52}\)Cohen, "Implementing" 22.

\(^{53}\)Cohen, "Implementing" 23.

\(^{54}\)Cohen, "Implementing" 24.
drawing to itself.\textsuperscript{55} Much of the code was used to build the internal representation.\textsuperscript{56} AARON's knowledge of the world at this stage was minimal, although by this time in his history he had participated during the preceding four year period in a series of museum exhibitions, including the Stedelijk Museum in 1979 and the Tate Gallery in 1983, and had produced several thousand unique drawings and three murals of acrylic paint on plaster or cotton.\textsuperscript{57}

AARON's growth through his late teens, a fourth stage, brought forth a sophistication in his knowledge base of the human figure and advanced his information base enabling him to create three dimensional depth on the flat surface.\textsuperscript{58} A 1985 Statue of Liberty image, entitled \textit{Liberty and Friends} (Plate XIV), rendered upon request and requiring a more specific knowledge base of the human type figure and spacial depth, provides the earliest example.\textsuperscript{59} A series of roughly shaped Statues of Liberty with torches raised above their heads constitute a triptych. The center consists of five statues with those in

\textsuperscript{55}Cohen, "Implementing" 24.
\textsuperscript{56}Cohen, "Implementing" 24.
\textsuperscript{57}Cohen, "Implementing" 24.
\textsuperscript{58}The male gender attribution of AARON is developed in my paper "Aaron: Portrait of the Young Machine as a Male Artist." A more general discussion of the computer program and gender is found in Sherry Turkle and Seymour Papert, "Epistemological Pluralism: Styles and Voices Within the Computer Culture," \textit{Signs} 16 (1990): 128-157.
\textsuperscript{59}Cohen, "Implementing" 24.
the background smaller and located towards the top of the image. The two sides repeat the liberty-type image, two figures to the left and three to the right, again the larger images in the foreground and the smaller ones in the upper ground. The 1985 Athlete Series (Plate XV), rendered for the Digital Equipment Corporation for the 1985 International Joint Conference on Artificial Intelligence in Los Angeles, further demonstrates how AARON's extended knowledge base included an understanding of how the human figure balances in a variety of postures. A noticeable difference occurred in these images. For the first time since the early 1950s Cohen again began to work with representational human imagery, a definite shift away from the more abstract formulations of both painted and computer generated works of the mid 1950s through the early 1980's. Cohen sensed that the balancing figures situated against a blank background lacked a surrounding context and late in 1985 he added rules governing plant morphology and growth to the AARON program. AARON began generating a wide variety of plants and trees, creating garden-like settings and locating human figures within the foliage (Plate XVI). In 1988 Cohen presented an invited paper, "How to Draw Three People in a Botanical Garden," for the American Association for Artificial Intelligence. In the paper he reiterated that for the past two decades

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60 Cohen, "Implementing" 24.

61 Cohen, "Implementing" 25-27.
AARON's task had been:

... to address questions that are both more fundamental and more general. What do computer programs -- and, paradigmatically, human beings -- need to know about the external world in order to build plausible visual representations of it. What kind of cognitive activity is involved in the making and reading of representations?62

In another paper written at approximately the same time, Cohen stressed that "AARON's function is to build representations," and "is intended as a model of cognitive activity: specifically, as a model of the way in which we recall low-level data from memory and use it to build, in imagination, apparently visual images."63 "... AARON is more concerned with the nature of representations than with the nature of objects, ... Its functional knowledge describes how the drawing of a figure behaves, ... not how a 'real' figure behaves."64 It is clear that in the AARON project Cohen proposed a working theory as a response to Wittkower's question. A focus on the appearance of the computer generated imagery of the AARON project misses Cohen's point. What is at stake, and beyond the surface of the image, is an understanding of how low-level human data, in conjunction with imagination, form visual images. Cohen's focus for the past three decades has

62Cohen, "How" 848.
63Cohen, "Implementing" 28.
64Cohen, "Implementing" 28.
centered on the art making process rather than the exhibitable art object.

From 1989 through 1990 AARON has generated little imagery because Cohen changed AARON's computer language base from "C" to the higher level and more flexible "Lisp" language. Along with this language change, Cohen continues to pursue experimentation that would enable AARON to work with a robotic arm, and to manipulate brush and paint. This would enhance the possibility of illuminating the visual cognitive processes of both line drawing and brush painting for then we would have a specific model illustrating both processes.

Cohen and the Development of Computer Related Art

Over the last twenty-five years computer technology has become an influential force in contemporary culture and offers new possibilities for art making. During this quarter century the use of the computer in art making has influenced the field of art and can be discussed under the rubric of "computer related art." Computer related art, conceived in the mid 1960s, has attempted to bring together science and art, a union that worked successfully in the early Italian Renaissance.\(^{65}\) This new investigation was initiated by scientists Frieder Nake, George Nees, A. Michael Noll, and artists John

\(^{65}\)See Hill.
Whitney and Charles Csuri. The visual artist, differing in focus from commercial computer graphic endeavors, pursues the process and development of art making by experimenting with the computer to achieve new possibilities for art making, as in the computer related work of Cohen.66

With the growth and expansion of possibilities linking science and art in computer generated imagery comes the concern for an historical recording of the developments. Such a consideration raises the question of an historical basis for the genre, and whether this should be situated in the history of science, or the history of the visual arts. The fine arts, existing for millennia, and the discipline of art history now some two centuries old, provide a more substantial basis from which to develop a historical and theoretical framework for computer generated art. The history of computer technology, and computer graphics, existing only since mid-century, furnishes a much sparser base. A difficulty impeding historical treatment is the problem, noted by David Carrier, "that neither the commercial journals nor art history magazines provide any model for the study of the interaction of art, science and

66John Sharer, Professor of Art Education at the Arizona State University, raised this point in a guest lecture at the Advanced Computing Center for the Arts and Design at The Ohio State University in January of 1991. Sharer discussed the difficulties that arise when attempting to incorporate the teaching of commercially driven computer related art into a university curriculum. Sharer observes that the commercial aspect has become more and more dominant.
Almost all writing about computer related art comes from the artists themselves.  

An historical foundation, established in traditional art history and joined to developments in technology, gives a basis for a history of computer related art. Building upon the interdisciplinary and collaborative links to artistic activity during the Early Italian Renaissance, further connections can be made with the Italian Futurists of the early twentieth century, Duchamp's view of the art object, the Surrealist use of automatism and Dali's Photo-Surrealism, and Conceptual Art of the 1960s. Also, a correlation to the History of Photography can be made, and in particular, the question of the mechanically reproduced image. Once a foundation is established in relation to the visual arts, science and technology and art and their co-development can be discussed, beginning with Laposky's first electronic machine graphic imagery of the 1950s, and continuing through present concerns that include Cohen's computer drawings generated through the

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69 See Hill.

employment of artificial intelligence and Myron Krueger's experimentation with the new frontier of "virtual reality."


In spite of misconceptions, computers have had impact on all the art forms and movements prominent in the last twenty years, including Conceptual Art, Earth Art, photo-realism, Performance Art, Minimal Art, holography, and robotics, as well as the more traditional genres of portraiture, landscape, and still life. Moreover, many artists who were seduced by the seemingly limitless possibilities of electronic media have reevaluated and transformed their total approach to the art making process. For these artists, the commitment to digital technology is philosophical as well as aesthetic. . . . The challenge of artificial intelligence is but one area that continues to inspire provocative research. . . . British artist Harold Cohen has taken the concept of an intelligent machine in a direction that embodies the dreams of both futuristic enthusiasts in the

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71See Goodman.
artificial intelligence field and the nightmares of many traditional artists. He has programmed a computer to control a mechanical drawing machine that is quite capable of making remarkably naturalistic drawings on its own.²²

More recently, in a discussion of the current impact of computer technology on the artistic process, Leonardo editor Roger Malina, posited four categories of activity and asks if these have resulted in significant art works.⁷³ His claims that artificial intelligence, his first category designation, is an important area of artistic research.⁷⁴ He notes the work of Harold Cohen and Roman Verostko, and the development by both of rule-based software programs that emphasize structure, form, and color. Cohen's purpose in designing the eighteen year old AARON drawing program was to investigate the cognitive principles that underlie and structure visual representation.⁷⁵ Verostko's system, working with paints and a paintbrush, generates paintings in a variety of styles. Interesting aspects of his program are the continually evolving software and the collaborative creative team of artist and computer.⁷⁶ The work of Cohen and Verostko vary from most other contemporary computer related art, for in the process of art making the artists

²²Goodman 16-17.

⁷³Malina 68.

⁷⁴Malina, "Computer" 68.


⁷⁶Malina, "Computer" 68.
develop and modify the hardware and software, whereas the others are contained, that is limited, by the possibilities of the hardware and software with which they work.\textsuperscript{77}

A second category noted by Malina is the addition of sound and evolution-in-time systems to hardware and software systems. The work of John Whitney and Edward Zajec represent examples of artists working to combine sound and visual art forms. They believe that the computer, with its ability to combine and control varying sensory activity, has the potential to lead the development of synaesthetic art forms.\textsuperscript{78}

Computer networks interlinked into telecommunications, a third category, opens up a broad collaborative frontier to the artist. Roy Ascott, a pioneer in computers and telecommunications, described a new role for the artist as "participant in a system creating meaning seen as art. This contrasts forcibly with the Renaissance paradigm of the artist standing apart from the world and depicting it and the observer standing outside of the artwork and receiving this depiction."\textsuperscript{79} Ascott called for a collaborative and interdisciplinary approach to art making that breaks down the nineteenth century model of the individual artist working solo in a northerly lit studio.

\textsuperscript{77}Malina, "Computer" 68.

\textsuperscript{78}Malina, "Computer" 68.

Gregory Bateson has argued that the human, plus the computer, plus the environment comprise a thinking system planetary in dimension. Bateson's concept can be envisioned in terms of telecommunications, a network in which the artist participates through new globally linked art media.

Interactivity, a fourth venue, is manifest in the area of "virtual or artificial reality." The work develops on the premise of interaction between the environment and the viewer, and "the possibilities of cybernetic machine have lured artists and scientists into unprecedented collaborations." In his "Artificial Reality" Myron Krueger has developed works in which play is incorporated in the physical interaction of viewer and the computer. In Krueger's 1983 interactive video environment Videoplace: Critter Interaction, a small moving critter plays with the participant whose video-digitized image appears on the screen as he or she pursues the critter. Whereas Malina applauds the accomplishments of artists such as Cohen in the area of artificial intelligence, he views the latter three as beginning stages for the interaction of

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81 Goodman 136.

82 Malina, "Computer" 69.

83 Goodman 136.
art and computer technology.  

Conclusion

Harold Cohen left Great Britain in 1968 disillusioned with painting. His painting no longer answered his basic questions. These stemmed from Wittkower's inquiry into how the structure of a visual image generates meaning to the viewer, and focused upon structure, communication, and process, rather than the finished art object so valued in the 1950s and 1960s by high modernism. Cohen, in a serendipitous manner, was introduced to the computer and programming shortly after his arrival in California in 1968. His subsequent involvement with the computer has led to a new way to search out his questions. Through the computer and its alliance with artificial intelligence that has resulted in the program AARON, Cohen has found a route to investigate how visual structure begets meaning to the viewer. Using the analogy of the human mind and the computer, Cohen is building a theory of visual representation that demonstrates how human cognition functions in the structuring of visual representations. Herbert Simon, in a review of the 1984 Cohen exhibition at the Buhl Science Center in Pittsburgh, captures the

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84 Malina, "Computer" 69.
85 See Becky Cohen 4; and Cohen, personal interview, 17 November 1986, 17.
point of what Cohen's computer generated art is about.

But computer art has a new dimension, too. Our interest can be caught not only by the final product but also by the process of making it. We watch the artist at work. Watching, we begin to catch a glimpse of how a computer program (and perhaps a human artist?) goes about creating pattern.\textsuperscript{86}

Chapter Four reviews what the critics have to say about Cohen's paintings and computer generated imagery.

\textsuperscript{86}Simon 15.
CHAPTER IV

CRITICS ON COHEN’S WORK

Commencing with his 1957 exhibition "Paintings of Harold Cohen; Sculpture by Hubert Dalwood" at the Gimpel Fils Gallery, London, Cohen’s work has generated a vast amount of critical commentary.¹ There are over two hundred critical commentaries on Cohen’s art making. To examine this critical breadth of Cohen as art maker, I will review the assessments of Cohen as painter during the 1950s and the 1960s, discuss the critical treatment of Cohen’s computer generated imagery, noting the new audience that arises in relation to his work on the computer, and finally, will point out a dichotomy in the critical appraisal of Cohen’s art.

¹For one of the earliest Cohen critiques see Lawrence Alloway, "Art News from London," Art News 55 (December, 1957): 47.
Cohen Paints and the Critics Write

Lawrence Alloway, renowned critic of modern English art as well as modern American art, continually reviewed Cohen paintings during the later years of the 1950s. His first discussion of Cohen’s work preceded the 1958 Cohen exhibition at the Gimpel Fils Gallery. Alloway, writing in *Art News* in December of 1957, noted a forthcoming showing of Cohen paintings in the new year at the Gimpel Fils Gallery.² He mentions Cohen’s connection to the Slade along with training under Coldstream and Wittkower that gave Cohen a "view of the world as something to be measured and art as the means of analysis."³ Alloway observed in the new work a shift in Cohen from "an analytical attitude" to "a kind of Abstract-Impressionism in which dabs of paint inundate objects and splashes of paint glow like headlights through misted windows," manifesting a new focus upon the "painting of light."⁴

Because of Alloway’s endorsement of Cohen’s 1958 exhibition, it is not surprising that later in 1958 Alloway and Cohen joined forces as co-curators of the exhibition "Abstract Impressionism," sponsored by the University of

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²See Alloway, "Art" 47.
³Alloway, "Art" 47.
⁴Alloway, "Art" 47.
Nottingham in conjunction with the Arts Council of Great Britain. Cohen exhibited the painting *Happy Day 1* and Alloway wrote the catalogue essay. Alloway, in a discussion of influences, commented that the earlier phases of modern art emphasized form, however, the more recent influences were painterly, the focus of the exhibition. He mentioned the painterly concerns of late Monet works that gave rise to experiments with light and nature, and Bonnard's use of paint that influenced "two artists as different as [Sam] Francis and Harold Cohen." He suggested as well that abstract impressionism developed "some of the potentialities present in Action Painting." In assessing Cohen's painting, Alloway shifted from his abstract impressionistic viewpoint of the 1958 Gimpel Fils show, and emphasized the measured grid, the "hidden trellis," that provided an underlying formality in earlier Cohen works.

The *Harold Cohen Retrospective 1956-1959* exhibition sponsored by the University of Nottingham followed a year later. Alastair Smart, Head of the Department of Fine Art, noted in the foreword that Cohen "now works, . . . on a truly American scale, and it is appropriate that this development should

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5Alloway, foreword 3.

6Alloway, foreword 3.

7Alloway, foreword 2.

8Alloway, foreword 4.
have coincided with his election to a Harkness Fellowship in the United States—a distinction upon which he is to be warmly congratulated."\(^9\) Alloway, in his continuing coverage of Cohen, stated that "between 1956 and 1959 the rate of Harold Cohen's development accelerated, when an opportunity for unbroken work coincided with a maturing ability to make decisions about his art and to act on them."\(^10\) The essay charts Cohen's development of the four year period. As in his 1957 pre-exhibition review, Alloway traced Cohen's Slade Wittkowerian grid lineage, and moved on to the Garden picture series of late 1957 and early 1958, for example, Garden 2, pointing out a relaxed grid that has turned into a faint trellis laden with blossoming color.\(^11\) Following a discussion of Cohen's use of paint marks and color in abstracted landscapes, Alloway asserted that "Cohen's space now affirmed this basic property of painted marks and no longer depended on a system of linear perspective, however fragmented or covert."\(^12\) He noted, that in 1958, Cohen incorporated Alan Davie's use of the heavy black outline, and Alloway pronounced this phase as "an interruption of the main lines of his development," during the latter half of the 1950s.\(^13\) This problem of the dominating black outline was

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\(^9\)Smart 2.

\(^10\)Alloway, introduction 3.

\(^11\)Alloway, introduction 3.

\(^12\)Alloway, introduction 4.

\(^13\)Alloway, introduction 4.
resolved, according to Alloway, when Cohen altered his use of black as a crutch for weaker colors to the final stage of the 1956-1959 work in which black was used in equal proportion to other colors. These paintings, for example, Painting 15 (Plate XVII) of 1959, "are dense, cloudy, continuous, the spatial entity of Wittkower starkly embodied. There are openings and traceries but they occur as thickening and thinning of a continuous paint structure." Alloway, in conclusion, stressed that these changes in Cohen's work did not come about through decisions easily made, referring back to his opening statement of the essay, and alluding to Cohen's thoughtful and experimental approach to art making.  

A. C. Sewter, in the review "Harold Cohen's Nottingham Paintings" for a London newspaper, confirmed the success of the exhibition.

The strides which he [Cohen] has taken between the first of his Nottingham paintings in 1956 and the most recent canvases of 1959, are, indeed, tremendous. By comparison with his latest works, the paintings of 1956 and even the Garden Series of 1957, for all their delicate charm of colour and their subtle sensibility in organisation, look hesitant and tentative. His artistic personality has expanded; he has acquired a new confidence and directness of expression.

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14 Alloway, introduction 5.

15 Alloway, introduction 5.

By the end of his first decade as a practicing artist, and partially due to Alloway’s continuing endorsement, Harold Cohen was an established and acclaimed young English modern painter.

Cohen’s Reputation Grows


From the liberating example of the American artists (comparative) emancipation, English artists undoubtedly for a time took the results as models to copy rather than precepts for individual speculation. But that phase has passed: Cohen and a few others have made their own declarations of independence which are saluted across the Atlantic - though a slight chauvinism, with inevitable blinkers, exists there and on the continent rather more than in England today.17

English art historian John Richardson began the exhibition catalogue "Introduction" with the observation:

This exhibition spans a mere five years of activity, but what a vast distance Harold Cohen has covered in this short time! The earliest pictures on these walls reveal the impact that America and

American painting had on the artist. The latest ones, completed only a few weeks ago, show that he has become one of the most serious and thought-provoking painters in England today.\textsuperscript{18}

Richardson goes on to note that prior to his New York visit Cohen "had been painting in an Abstract Expressionist idiom," in the style of American painting.\textsuperscript{19} This provided a vital alternative to the provincialism of English painting, and a reliance upon Paris.\textsuperscript{20} He explains that Cohen's exposure to American Abstract Expressionism in New York leads to a disenchantment with the movement, causing "restless inactivity" and finally to a reformulation of his approach to painting.\textsuperscript{21} Richardson follows this progression from the early stages of reducing painting to basic essentials observed in Parkway, through the reconstruction stages of the early 1960s. Upon his return to London at the end of 1961, "Cohen's paintings proved to be more in theoretical than in practical danger from the reducing process."\textsuperscript{22} This difficulty moves towards resolution in works such as Alcide of 1962 as the frame-like borders counteract the strong horizontal lines of the works of 1961, and more importantly, "\ldots"

\textsuperscript{18} Richardson 9.
\textsuperscript{19} Richardson 9.
\textsuperscript{20} Richardson 9.
\textsuperscript{21} Richardson 9-10.
\textsuperscript{22} Richardson 11.
these frames stress the identity of what is inside them as images."23

Richardson applauded the complexity of the 1963 series of which Before the Event and Conclave are strong representatives. The importance of these "new paintings is that they offer a number of new solutions to problems which have obsessed him for years: problems of identity, problems connected with the function of the ground, of colour and tone."24 Richardson's final focus rests upon Cohen's striking new use of color. Cohen did not separate, as do the American painters, drawing and painting, but saw that "... drawing is inevitable, at the point where one passes from the colour to its environment - at the edge of the shape."25 Works such as As If (Plate XVIII) and Field Day of 1965, according to Richardson, represent "the artist's most adventuresome compositions to date, the device of juxtaposing two statements, one about colour and tone, the other purely about tone, is one of his most provocative inventions."26

Richardson's favorable evaluation of Cohen's work during the first five years of the 1960s received reinforcement when Cohen was chosen to make an installation for the prestigious Documenta, for its 1964 exhibition in Kassel,

23Richardson 11.
24Richardson 15.
25Richardson 16.
26Richardson 16.
PLATE XVIII. Harold Cohen, *As If*, acrylic on canvas, 102" x 102", 1965.
Germany. In 1966, along with four other British artists, he was selected to represent Great Britain at the XXIII Venice Biennale. During the early sixties he was invited to exhibit at the Duexieme Biennale de Paris (1961), The VII Tokyo Biennale (1963), and The Tate Gallery (1963). By the middle of the decade, Cohen's works had been purchased by a variety of public collections: The Art Gallery of Toronto, The Arts Council of Great Britain, The British Council, Nottingham University, The Tate Gallery, and The Peter Stuyvesant Foundation.²⁷

Cohen's work, along with other young British artists, was selected for inclusion in the 1967 exhibition "Jeunes Peintres Anglais/Jonge Britse Schilders," held at the Palais des Beaux-Arts, Brussels. R. Morphet, of the Tate Gallery, discussed the criteria for choosing the artists to be exhibited.

In the early 1960's, the point of departure for critical consideration of the work of any artist in this exhibition tended to be whatever broad collective preoccupations united the particular "wave" of the avant-garde in which he made his first mature appearance. Thus Bernard Cohen, Harold Cohen, Denny and Hoyland belonged to the first generation for who, American abstraction was both decisively formative, and accessible as a matter of course. Their work related to it both fundamentally and naturally and gave promise of a development of parallel vigour; a new scale and directness of presentation entered British art.²⁸

²⁷Richardson 19.

Alan Bowness, director of the Tate Gallery, Michael Compton, also of the Tate Gallery, and Andrew Forge, a Slade teacher during the Cohen year's and now Professor at the Yale University School of the Visual Arts, have meticulously followed Cohen's career. In 1965 Forge described Cohen as "the most intelligent and driving of the generation young enough to be able to look at American painting with detachment." In commenting on the quality of a Cohen work similar to *Pastoral* of 1965 Forge asserted:

... The phrase "semantic painting" has been widely canvassed, often by people who have not altogether grasped the fact that what puts Harold Cohen, or Jasper Johns for that matter, in a class of his own is not simply the content of his inquiry, but the fact that he has been able to use it to structure a powerful constructive drive. The work, the painting about the meaning of painting, is itself a distinguished painting.

In the catalogue for the 1983 *Harold Cohen* Tate Gallery exhibition, Compton and Bowness spoke of the significance of Cohen as a modern English painter. Compton asserted that Cohen's reputation as a painter equalled any of the artists of his generation. "He was a successful painter

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29This information came forward from both Bowness and Compton when I spoke with them at the Tate Gallery in June of 1988, and in a telephone conversation with Forge in the winter of 1990.

30Becky Cohen 1.

31Becky Cohen 1-2.

32Compton 19.
and could look forward to a long and rewarding career.\textsuperscript{33} Bowness noted that:

Harold Cohen first made his reputation as an abstract painter in London in the 1950s, and the Tate Gallery owns two large and important works of 1961 and 1962. The artist's move to the west coast of the United States shortly afterwards and his abandoning of easel paintings for more experimental media have meant that we have lost sight of one of the outstanding talents of his generation.\textsuperscript{34}

\textit{Cohen's Computer Generated Imagery and a New Critical Audience}

With his move to California and the computer, Cohen was mainly ignored by the English and American critics who had written so extensively about his modernist paintings.\textsuperscript{35} This is illustrated by the few reviews he received in 1970-1971, although his work was exhibited in the US, Great Britain, and Japan.\textsuperscript{36} Becky Cohen wrote the catalogue essay for the exhibition \textit{Harold Cohen Paintings 1965-1975}, a first major essay on Cohen's

\textsuperscript{33}Compton 19.

\textsuperscript{34}Bowness, foreword 5.

\textsuperscript{35}Cohen, personal interview, 17 November 1986, 23.

\textsuperscript{36}See Harold Cohen curriculum vitae, 1986, 19.
computer generated imagery. This catalogue is the first notable critical writing about Cohen's work since his move to California and the computer. The exhibition and catalogue essay follows a similar conceptual approach as the 1965 Whitechapel Art Gallery Harold Cohen Paintings 1960-1965. Her essay emulates Richardson's commentary, interspersing quotations of Cohen within the chronological development of the work. Beginning with a discussion of the 1965 works, Becky Cohen progressed through the 1968 "spotty" paintings to their relocation at the University of California at San Diego.

As the "spotty" paintings were designed to eliminate drawing while still maintaining some reasonable vehicle or residence for color, so was this desire continued in NINE THRU ONE, though the "all in one go" look comes about not through a physical device like the masks, but from the first computer-generated design written by Cohen for paintings. . . From a desire to find a new way to break up the surface of the painting, he came up with a program that generated a design, rather like the cracks that form in dried mud, with the notion of filling in the consequent "territories" with color. . . Though his computer program generated the new of "cracks" in a very different way . . . the result was drawing: drawing like a crack, like a natural boundary, like freehand drawing.

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37See Becky Cohen.
38Becky Cohen 1-5.
39Becky Cohen 4-5.
Her commentary differs from other critics for she chose mainly description rather than interpretation and judgment. Her description makes clear the cohesion in Cohen's transition from painting to computer, and indicates an underlying emphasis on drawing. "After 1972," observed Becky Cohen, "Cohen stopped putting paint on canvas and devoted his time almost exclusively to questions surrounding the nature of drawing. He maintained that the artist's process is examinable and began simulating by machine his own free-hand drawing." In her closing paragraph, she discusses the last work of the exhibition, Machine Drawing of 1975, generated by a Cohen program. Her discussion emphasizes a main concern of the computer generated imagery, that "everything is determined from the first mark," a reference to a BBC interview in 1966 of the five English artists chosen to represent Great Britain at the Venice Biennale. In the 1966 BBC interview Cohen observed that

by the time I've started putting the paint on [the canvas] I've already got the sense of what the whole painting is going to be like and more and more I want to paint pictures in which the whole thing is done on this level, the whole painting, as if the whole painting is done in one go. . . . I'd like

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40Becky Cohen 5.
41Becky Cohen 8.
42Becky Cohen 2, 8.
everything to be determined from the first mark.\textsuperscript{43} She interprets the 1966 reference as "unconsciously prophetic," noting that with the computer and by 1975 Cohen fulfilled his objective.\textsuperscript{44} Cohen’s statement of this goal contradicts an Alloway interpretation in the 1959 introductory essay of \textit{Harold Cohen Retrospective 1956-1959}. Alloway pointed out that in the 1956 paintings Cohen was obsessed with tiny squares, which Alloway labeled "symbols of order," and further, commented that Cohen "recognised the limitations of imposing order on his pictures by the automatic application of a system."\textsuperscript{45} In 1966 Cohen suggested such a system, and by 1975, he developed a computer program where the image is "determined from the first mark," modeling human art making activity.\textsuperscript{46}

The computer generated art making of Harold Cohen, of little interest to many of the critics that followed his painting career, began to attract new audiences and critics along with the continued writing on Cohen by Becky Cohen. From the mid 1970s through the early 1990s Cohen has been written about in such diverse computer journals as \textit{Computer Bulletin}, \textit{Computerworld}, \textit{Computer Music Journal}, \textit{Computer Graphics World}, \textit{Digital

\textsuperscript{43}Becky Cohen 2.  
\textsuperscript{44}Becky Cohen 2.  
\textsuperscript{45}Alloway, introduction 3.  
\textsuperscript{46}Becky Cohen 2.
Computer Museum Report, AI Magazine, Software News, Popular Computing, and The Visual Computer. Cohen has been invited to present papers at the most prestigious artificial intelligence academic conferences, the 6th International Joint Conference on Artificial Intelligence in 1979, and the American Association of Artificial Intelligence in 1988.47

The artificial intelligence community included Cohen in its membership. They regarded his computer generated imagery as one of the few successful working expert systems.48 Since the late 1970s Cohen's art making on the computer with program AARON has been highly praised by Herbert Simon, an AI co-founder and 1978 Nobel Laureate. In an essay for the 1984 Harold Cohen Computer-As-Artist exhibition catalogue Simon appraised Cohen's work:

I suppose the simplest way to put it is that artists produce significant work only when their "programs" are adequately endowed with artistic values and taste. And computers produce significant artistic work only when their programs are similarly endowed. The merit of Harold Cohen's work is that he has delved deeply enough into the process of drawing, has understood sufficiently how aesthetic criteria are incorporated in that process, that he has been able to create computer programs that have taste.

47His papers were published in the proceedings of each conference: Cohen, "What" 1028-1057, and "How" 846-855.

There are at least three levels, then, at which we can enjoy these drawings. We can enjoy the forms themselves. We can enjoy watching them being made. And we can enjoy studying the programs that produce them, and can arrive, thereby, at some understanding of the nature of technique and creativity, and the ways in which the one is inextricably intertwined with the other.\textsuperscript{49}

Margaret A. Boden, Professor of Philosophy and Psychology at the University of Sussex and a friend of Cohen, endorsed his work as an artist-computer programmer.\textsuperscript{50} She discussed Cohen's contribution in a catalogue essay for the 1983 Tate Harold Cohen exhibition:

Harold Cohen's work as artist-programmer has been devoted to the production of quasi-representational artefacts, where these are generated by his program rather than by his own hand directly. . . . It [the program] is intended as a preliminary model of the creative process, which is self-adaptive to a degree and is continually being further developed by Cohen himself. The exhibits can be appreciated individually, but are better regarded as a range of visual forms with shared underlying structures - many of which are not obvious at first sight. These deep structures, of course, are precisely specified in the representational base of the program which generated the pictures. Our enjoyment of the drawings depends not on the absence of any rules, but on the artist's skills in modelling generative structures similar in significant respects to those by which the human mind assigns meaning to the

\textsuperscript{49}Simon 16.

\textsuperscript{50}Cohen, personal interview, 14 February 1989.
The discussions of Boden and Simon take into account the visual image, the process, the computer code, and most importantly address the artist's skill in modeling structures similar to those through which the human mind ascribes meaning to the world.

Confirmation Within the Visual Arts Community

Along with the affirmation Cohen's enterprise received from the artificial intelligence community, there were those in the visual arts who viewed Cohen's computer work as a contribution. Harold Cohen remained of continual interest to Andrew Forge whose criticism spans both paintings and computer imagery. His written critiques of Cohen have been published in *Artforum, Art News*, and most recently in an exhibition catalogue essay for the San Francisco Museum of Art 1979 exhibition, "On Harold Cohen's Drawings." Forge contends that Cohen's computer work, which he views as a whole and not disconnected from the earlier paintings, embodies three

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51 Boden, "Creativity" 18.

52 Andrew Forge, telephone interview, spring 1990.

components: the computer program with the theory and practice of drawing forming its content; the computer drawings with their public exposure; and Cohen's writing, reflections, about the theory and practice of his work. Speaking of the most significant aspect of the work, Forge pointed out the issue of interpretation, noting that Cohen "opens up an unfamiliar angle" in his investigation of interpretation. In his conclusion Forge indicated the importance of Cohen's activity in relation to the contemporary visual arts scene:

If I understand him correctly, Cohen is telling us that art is, in the most general and universal sense, a kind of meditation on the power of the human mind to symbolize. It is a tonic message, deeply humanistic, and liberating, at least to any one who has suffered the claustrophobia of the historicist tradition, whether in the form of art historical theory or the strictures of the art scene.

Cynthia Goodman, in a 1986 College Art Association session on "Computers and Art" and in her text Digital Visions: Computer and Art, credited Cohen for the development of an intelligent drawing machine and the drawings it generates: "The artist has now developed his programs to such an extent that in addition to their former repertoire of abstract forms with tentative naturalistic references, the programs are capable of creating realistic

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54 Forge, "On" 2.
55 Forge, "On" 2.
56 Forge, "On" 4.
drawings of plantlife, as well as convincing portrayals of the human body.  

The Tate Gallery validated Cohen's art making on the computer through its presentation of the 1983 Tate exhibition Harold Cohen, its first major exhibition of his work. Compton, of the Tate Gallery, in an exhibition catalogue essay, followed the stages of Cohen's evolution from the acclaimed abstract works of Documenta III and the XXIII Venice Biennale through Cohen's movement to the computer and the developmental stages of his computer generated imagery. Compton closed his essay in a reflective statement on Cohen's work:

If one considers seriously the drawings that the machines in this exhibition generate, together with what one may infer of the program that generates them and the cultural and social context in which they are presented, I believe it is possible to learn something very important. Long before, he had sought to explore the mind in his study of perception. In the last few years the power that the computer gives him to generate large quantities of drawings from carefully constructed programs has given him the possibility of exhibiting a completely original and revealing model of one of the mind's most remarkable characteristics, its ability to read marks as symbols.

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57 Goodman 59.

58 Compton 19-23.

59 Compton 23.
In recent correspondence Compton asserted that art making with the computer comprises "... the most interesting work of Harold Cohen."

Along with Compton's evaluation of Cohen's work in the 1983 Tate Gallery catalogue essay, Alan Bowness also endorsed Cohen's computer generated imagery. Following his observation that Cohen had been lost from sight by his London critics, Bowness continued by noting that "since 1968 Harold Cohen has been working with computers, and no artist has explored this field with such thoroughness and such success."

The Unfavorable Critics

Alongside the new appreciative audience of Cohen and those, such as Forge, Compton, and Bowness, who have stayed abreast of Cohen's development, are the critics who attribute little importance to Cohen's computer work. This situation was a result of two circumstances. First, Cohen's move to the west coast of the United States and to the computer, according to Bowness, has meant that the British visual arts community lost sight of Cohen. Cohen has acknowledged that because of his move he lost

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60 Michael Compton letter to Mary Leigh Morbey with regard to the Cohen's art making on the computer, dated 18 August 1989.

61 Bowness, foreword 5.

62 Bowness, foreword 5.
contact with London acquaintances and in some cases has not bothered to keep them informed of the developments in his art making. Second, written critiques of the computer generated works have questioned the validity of Cohen's computer activity. James Burr, who had written a positive review in 1963 of Cohen's painting, sharply questioned the computer generated imagery in the 1983 Tate exhibition.

This exhibition consists principally of four large computer-driven drawing machines, programmed by Harold Cohen so that his decisions and their permutations can produce twelve drawings an hour. However the point is not that the high technology of an artificial intelligence can do this, as it is no more than a very sophisticated implement: one must question the quality and aesthetic relevance of the result. The end product, in this case is disappointingly aimless, an innovative technological game but aesthetically sterile. This seems a wrong direction for creativity to take, as it can not be involved in human concerns and expressive vitality.

Other critics writing for London newspapers came to similar conclusions about Cohen's 1983 Tate exhibition. John Russell Taylor, writing for the London Times observed "the imagery is all carefully controlled according to limits laid down by Cohen himself, and the only advantage of

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63 Cohen, personal interview, 14 February 1989.

doing it mechanically seems to be the untiring prolificity of the computers. . . . Interesting to watch, but difficult to see in terms of a breakthrough.\textsuperscript{65} Taylor noted that if one of the machines were to take off, and produce an undreamed of masterpiece, that would add excitement.\textsuperscript{66} However, he concluded, this "does not happen outside a story by Stephen King. Does it?" suggesting that any exciting work of Cohen lies in the realm of science fiction.\textsuperscript{67} William Feaver, writing for The Observer, continued the disdain. His discussion centered on tireless, relentless productivity of program AARON.\textsuperscript{68} Comparing AARON's output to Klee's output of a painting or drawing a day, and noting than Joseph Beuys's has already out performed Klee, he noted "Harold Cohen and his studio computer leave Beuys and Klee standing."\textsuperscript{69} The Standard's Richard Cork continued in a similar vein mentioning that Cohen wrote in the exhibition catalogue that AARON, currently in a infantile stage, eventually will become creative.\textsuperscript{70} Cork asserted that this statement "... sounds more like a threat than a prediction.

\begin{footnotes}
\footnotetext{66}{Taylor 12.}
\footnotetext{67}{Taylor 12.}
\footnotetext{68}{William Feaver, "Robot at Work," The Observer 19 June 1983: 33.}
\footnotetext{69}{Feaver 33.}
\footnotetext{70}{Richard Cork, "What Will Aaron Draw When He Grows Up?" The Standard 16 June 1983: 18.}
\end{footnotes}
to be welcomed.\textsuperscript{71}

The unfavorable criticism of Cohen's art making on the computer in the early 1980s brings to the fore a second and more subtle factor concerning a critical review of the entire body of Cohen's work. The renowned visual arts critics who covered Cohen's painting during the 1950s and 1960s have not written critically about his computer imagery. Most noticeably in this grouping are Alloway, Richardson, and Dore Ashton; also absent are writings by Robert Melville and John Russell, reviewers of Cohen's work between 1963 and 1966.\textsuperscript{72} A shift in criticism of Cohen's work, from those attending to the celebrated modernist paintings, to a different audience who evaluates and validates the computer imagery, with a few critics striding both, leads to a dichotomy in assessing the art making of Harold Cohen.

\textsuperscript{71}Cork 18.

Conclusion

During the first two decades of Cohen's art making, his growing reputation as an outstanding modern English painter was noted by acclaimed critics. However, the transition to the computer and his move to southern California not only altered how he made art, but also changed the critical discussion. The criticism of his work lies with two different audiences, one concerned with modernism and the visual arts, and the other with the computer and artificial intelligence. Their appraisals of Harold Cohen and his art making sharply differ.

The critical basis for modern art theory rests on the formalist ideas of Clement Greenberg, with formal qualities providing "a theoretical and critical basis for defending and evaluating the increasingly abstract qualities of Modern art." During the 1950s and 1960s Cohen's painting was extolled, by Alloway and Richardson, according to the standards of modern formalist theory. Although the 1979 San Francisco mural and even the 1983 Tate mural resemble his earlier 1960 paintings, Cohen's move to the computer and away from the formalist concerns of modern art brought forth a new focus in his art making. The computer generated imagery requires a critical approach that

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accounts for Cohen’s investigation, the computer process, and of least importance, the finished work of art. To date, there exists no one critical approach that has facilitated a clear and unified reading of both Cohen’s painted and computer generated imagery. Our contemporary post-modern discussion, or condition, so described by French philosopher Jean-Francois Lyotard, questions the premises of modernism and looks to new ways to address, and assess, our contemporary culture. In like manner, Cohen also questions the suppositions of modernism. A new way to address Cohen, then, ought to be attempted.

A more suitable approach would be to consider Cohen’s work as a unity. Rather than a disjointed deliberation over canvas painting and computer generated imagery, a unified view of his work is substantiated in the premise developed in Chapter Two that Cohen’s art making developed out of his investigation of Wittkower’s query of how visual structure communicates meaning to the viewer. In Chapter Five I will analyze Cohen’s canvas paintings and computer generated imagery.

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An analysis of Harold Cohen's imagery, on canvas and on the computer, reveals the internal context of his work. In the preceding three chapters we examined the original context of Cohen's work, that is, the theoretical and historical contexts from which it emerged. In addition, we reviewed the external context of his work, the situation in which his work was presented and continues to exist, and the critics comments on his work. An examination of the internal context of the body of work, looking to subject matter, form, and medium, provides a fuller historical and critical accounting of Cohen's imagery.

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1Barrett 77-79.

2Barrett 79.

3Barrett 76-77.
I will describe, interpret, and evaluate the body of Cohen’s work, beginning with his early abstract impressionistic art of the late 1950s. I will move to his better known paintings of the 1960s and then to the early computer generated works of the 1970s. These are followed by an analysis of a series of monumental computer generated murals in the late 1970s and early 1980s. During the 1980s Cohen, with his AARON program, developed a more representational imagery, first incorporating flora and trees, and then adding the human like figure to the tree and plant foliage. In the early 1990s the knowledge base of the AARON program was expanded to create a more sophisticated human like female figure. These works will be examined. Further, I will evaluate the contribution of the imagery to late twentieth century art and show how it continues Cohen’s quest to understand how visual symbols yield meaning to the viewer.

Cohen’s Abstract Impressionism

The first body of Cohen’s striking art emerged in 1957, 1958, and 1959. This work is captured in Elaine de Kooning’s descriptive title “Abstract Impressionism,” for in the paintings uniform patterns of strokes rendered in an Impressionistic manner emphasize an optical interplay of light, space, and
air, rather than optical effects on nature. Painting 15 (please refer to Plate XVII) of 1959, a horizontally angled rectangular canvas laden with paint, plays out a dance of repetitive black and white splashes of thick paint waltzing left to right across the canvas surface. Dashes of orangey-yellow paint laid alongside the chromatics add a feeling of airiness. We find ourselves moving through a dense, cloud-like, lyrical space, flowing with the rich painterly flat surface superimposed over a structuring grid that is taking us somewhere, moving off the right side of the canvas as our eye imaginatively continues the movement of the horizontal black stripe. Painting 15 is reminiscent of the light, colour, and painterliness of Monet’s water lilies, and at the same time retains the subtle under grid that harkens back to Cohen’s classical training at the Slade under Wittkower. This work, along with other works of 1957-1959, was acknowledged by the British avant-garde of the 1950s and at the same time, the proportional under grid, confirmed a lingering alliance to the more classical heritage of the Slade. The strength of the work, and similar works such as Happy Day 1 (please refer to Plate IV) of 1958 and Thunder Beach (please refer to Plate III) of the same year, propelled him into the forefront of recognized young British artists. This newly earned reputation was acknowledged by the Harkness Fellowship of the Commonwealth Fund and

4 Alloway, "Some" 2.

5 Alloway, "Some" 2-4; and introduction 3-5.
Fulbright Travel awards that he received in 1959.

The Abstract Expressionist Works of the 1960s

The Harkness and Fulbright awards provided the funding for Cohen to spend 1959-1960 in New York City bathing in the milieu of the American Abstract Expressionists. Cohen encountered both the action-based, gesture painting of Jackson Pollock and Willem de Kooning along with the field painting of Clifford Still, Mark Rothko, and Barnett Newman. His works of the early to mid 1960s reflect this New York influence. Shinnecock (please refer to Plate VII) of 1960, a sharply differing image than the abstract impressionist Painting 15, demonstrates the impact of the New York School of Abstract Expressionism on Cohen. The long rectangle of Painting 15 alters to almost a square in Shinnecock, measuring 88 1/2" x 96". The thick paint of Shinnecock flattens out to a smooth surface. Although the colors of the two paintings are similar, their usage and distribution differ. The clear, solid colored layers of white, yellow, black, blue, and cool blue-green in Shinnecock rise like stratigraphic layers from the bottom to the top of the canvas. The clean use of pastel colored oil paint gives the work a pristine, soft appearance. Distribution of the horizontally banded layers that alternate from a thick band, to a thin line, to a rhythm of thicker and thinner bands, renders a lyrical quality. Although the formally ordered under grid of Painting 15 is not
present, there remains a less formal undergrid upon which the flat banded layers sit.

*Shinnecock* demonstrates an indebtedness to the field paintings of Mark Rothko and in particular, Barnett Newman, as was argued in Chapter Two. Along with the soft fields of solid abstract color reminiscent of, for example, Newman's *Queen of the Night I* of 1951, *Shinnecock* is an excellent representative of Clement Greenberg's theory of modernist formalism. Greenberg, building on Kant's notion that design (form) is what is essential to painting and sculpture, concluded that the irreducible feature of painting is flatness situated in abstract form. Thus, Greenberg asserted that in the bypassing of both subject matter and content, form could be recognized as universal. This definition of the relationship between medium and form is the central tenet of Greenbergian formalism and it is this feature "that has come to be considered the basis of all of Modernism in art." Cohen's imagery of the early 1960s, like Newman's, works out the Greenbergian formulation, presenting flat bold fields of color and softly ridged lines. Through his emphasis on form Greenberg provides "a means of insuring

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7Risatti 4.

8Risatti 5.
aesthetic quality in future art. His aesthetic gives a precise visual approach through form and color with an intention to contest the growing influence of kitsch, which Greenberg defined as "a debased form of high art for the urbanized masses."

Blossom (please refer to Plate XI) of 1964 provides a later example of Cohen's development within the context of Greenbergian modernist formalism. The canvas has taken the ordered shape of a square of 102" x 102". The straightish, Newmanish lines of Shinnecock, however, give way to floating organic shapes, similar in appearance to amoeba forms observed under a microscope. Color, form, and flatness continue to dominate the image. However, these play out components in painting that during the early sixties became essential in Cohen's lexicon. A distinction between figure and ground gained importance as observed in the outlined and sometimes colored amoeba forms floating flatly atop the white gessoed background. The organic forms are both closed and open, contained within the canvas on the left side and floating off the canvas edges at both top and bottom. The forms repeat, although not as identical replicas, and an asymmetrical balance of delicate and bold lines and bright, flat reds, blues, greens, and orange activate the otherwise static square. Although the amoeba shapes float in a similar

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9Risatti 5.

manner to lily pads on water, an almost indiscernible under grid keeps them flatly attached to the surface of the canvas. Greenberg’s focus on color, form, and flatness, observed in Blossom, became the central visual emphasis of Cohen’s paintings of the early to mid 1960s.

Cohen’s excellently rendered paintings of the early and mid 1960s represent the Greenbergian aesthetic and for this reason they are well-known. Tribune of 1962 and Before the Event of 1963, owned by the Tate Gallery, along with Pastoral of 1965 that was exhibited at the XXIII Venice Biennale in 1966, are recognized as strong examples of modern formalist Greenbergian theory that have come to be classified as High Modern Art.

Cohen’s Early Computer Generated Imagery and the Monumental Murals

Cohen’s transition from canvas to computer demonstrates a shift in concern from the production of modernist formalist imagery to a questioning of what his art was about and his lingering concern with the building of a theory of representation. Although the shift appears dramatic, and left formalist critics and art historians wondering how to continue to analyze the work of Cohen and his computer artist AARON, the suggestion for such a shift can be found in Greenbergian theory. Greenberg contended that Kant’s theory expounded in the Critique of Judgment enabled a purifying of critical methods since Kant’s philosophical inquiry used logic to decide the
parameters of the discipline of logic; thus "logic was used to criticize logic."\textsuperscript{11} Greenberg labelled Kant's approach as "self-critical" and called it a model of what every discipline should do, and advocated a self-reflexive, self-critical approach to art.\textsuperscript{12} Hence, from the viewpoint of Greenbergian formalism, self-criticism is a part of the critical method, and can lead an artist or critic to consider other possibilities concerning art theory, art making, and art criticism, as is the case with Harold Cohen.

Cohen was introduced to the computer in 1968. It was not until the early 1970s, however, that the young AARON computer program, developed by Cohen, produced a computer generated drawing in India ink that Cohen hand colored (Plate XIX). The simple drawing of a series of amoeba shapes, executed through a basic beginning stage in the AARON program, is not all that different from the Blossom painting of 1964 and retains a similar quality to Cohen’s paintings of the early to mid 1960s. The subtle under grid of Blossom is replaced by the ordering of AARON’s code, that is, the text that structures the AARON program. The logical ordering emphasized by Wittkower in his discussions on measurement and proportions of Italian Renaissance art and architecture continues in the logical, rule-driven, hierarchical ordering of the representational symbol system approach of

\textsuperscript{11}Risatti 1-3.

\textsuperscript{12}Risatti 5.
PLATE XIX. Harold Cohen, Untitled, computer generated drawing, india ink on paper, hand colored in pencil, 8" x 10", 1973
programming that formed AARON's code. Cohen programmed AARON's art making knowledge base to embody the five essential elements of figure/ground, open/closed form, insideness/outsideness, repetition, and symmetry that he used in his modernist paintings. These essentials are evidenced in the situating of hand colored amoeba forms in the foreground against a white background, the closed and sometimes multiple closed amoeba forms, the differentiation between inside and outside of the amoeba shapes, repetition of the forms, and asymmetrical balance. The choice of bold, flat, solid primary and secondary colors is almost the same as found in Blossom, apart from the inclusion of yellow in the computer drawing. A comparison of the two works, with an awareness of their many similarities, leads to a tentative conclusion that both are representative of Greenbergian modernism, but this is not the case. A Greenbergian analysis, appropriate for an evaluation of Blossom, falls short when applied to the computer drawing. It misses any analysis of what computer artist AARON is about in the generation of the imagery.

The Untitled AARON mural drawing (please refer to Plate X) (hardware: Digital Equipment Corporation MicroVAX II; software: the AARON program) of 1979 for the San Francisco Museum of Modern Art commenced a series of AARON mural drawings that embody Cohen's five basic components employed in both Blossom and the 1973 hand colored computer generated ink drawing. The San Francisco mural, containing the
amoeba flat and boldly colored shapes of both *Blossom* and the 1973 drawing, parallels the sophisticated use of line and composition of the 1964 painting. The long mural, 14’ x 110’, AARON generated drawing with hand colored areas by Cohen, contains not only amoeba forms boasting thin to thick wing spreads, but also horizontally stacked, boldly colored bands reminiscent of *Shinnecock*. The mural includes a variety of imagery from earlier Cohen works. The idea of differing sections or mappings in a continuous image is consistent with the triptych *Before the Event*, as are the assortment of shapes such as eyes, single units comprised of a series of brightly colored connected stripes perpendicular to the base of the image, and the visual movement of the imagery beyond the physical parameters of the works. Cohen’s choice of bold, bright, flat primary and secondary colors remained consistent in both paintings of the 1960s and the early computer imagery.

Difficulty arises in the interpretation and evaluation of the San Francisco mural as well as Cohen’s first computer generated hand painted image of 1973. Because of the visual similarities to Cohen’s abstract expressionist works there is a temptation to analyze them from a modernist formalist viewpoint. Cohen’s computer generated imagery is about something quite different from his modernist paintings. Whereas the works of the 1960s have been judged and valued as a contribution to modern art because they possess aesthetic quality according to the criteria of Greenbergian formalist theory, these criteria are not appropriate to, nor the basis for, AARON’s art
production. Thus the question arises of how to interpret and evaluate the works of AARON, whose production can be observed through watching a computer mouse move about a canvas executing drawings (please refer to Plate X), or in more recent years through the activity of a computer plotter producing the drawings on canvas. This question requires an understanding of the basis for the AARON program as explained in Chapter Three. Since AARON's function is to build representations about how visual images are formed in humans, duplicating how this occurs in the mind of Harold Cohen, and to provide a model of cognitive activity in the domain of art making, then the criteria for judging AARON's work shifts from the modernist aesthetic to a judgment based on an evaluation of cognitive activity. Is Cohen achieving his objective of providing in AARON a model of cognitive activity in relation to art making, and what contribution, if any, does this model make to our understanding of art making?

An answer to these questions will be provided through an analysis of a second Untitled AARON mural (please refer to Plate XII), 14' x 60', rendered for the Tate Gallery 1983 Harold Cohen exhibition. This particular mural is chosen as a strong representative of a series of murals produced in 1983 and 1984 that include, among others, an untitled tapestry woven in cotton and wool, 6' x 9', and housed in the collection of the Standard Life Insurance Company in Edinburgh, Scotland, and an untitled mural, AARON drawn and hand painted, installed for the 1984 exhibition "The Artist As A
Young Machine" at the Ontario Science Centre, Toronto. The Tate Gallery mural follows the same idea as the San Francisco image. In both there is a sense of continuance rather than closure because the images move off the two sides and the top and bottom. Although color choices are similar in both murals, the Tate work contains more nuanced variations of primary and secondary colors. There are subtle color changes in the differing greens, browns, pinks, reds, yellows, and blues. Larger non-figurative organic shapes appear reminiscent of rock formations and dripping stalactites, giving the impression that the AARON program has knowledge about drawing natural forms. The shapes fit more tightly together so that the brightly hand colored, computer drawn shapes comprise a dense and rich composition with little background left on the white cotton canvas.

The tightly woven composition appears stronger than the San Francisco mural with its striking visual qualities - shapes, arrangement of shapes, and color - reminiscent of Before the Event. Cohen was building within the AARON program his own drawing expertise and adding an understanding of painted color that came from his quarter century of art making. The difference, however, is that he is using his art making expertise to experiment with theory building concerning how humans cognitively form visual imagery. This difference becomes apparent in the subtle introduction of what appear to be figurative rock patterns and stalactite lime configurations, when Cohen expanded his and AARON's subject matter to include figurative images, an
addition to his imagery lexicon. Thus, for Cohen, an emphasis on Greenberg’s insistence on form, color, and flatness to determine the aesthetic value of painting shifted to the concern to learn how human beings form imagery in their heads. In this quest he has loaded AARON’s knowledge base with knowledge of the more classical approach to art making that he learned at the Slade School of Art. He did this in order to get closer to an understanding of how he, and by extension others, form visual imagery cognitively. The building of a theory that addresses how human cognition functions in the structuring of visual representations assisted his investigation of how visual symbols, or structures, yield meaning to the viewer.

Cohen’s concern to understand the cognitive and communicative structure of art is shared by postmodern theory that gives emphasis not to things, such as completed visual art objects, but to the investigation of how structures of things make meaning possible. This approach has been termed a "structuralist" way of thinking, for it stresses that the importance of things "can only be determined when they are integrated into the structure of which they form a part."

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13Risatti 119.

14Risatti 119.
From Rocks to People

In the 1985 hand colored AARON drawing Untitled (please refer to Plate XIII) there is a further expansion of AARON's knowledge base to include recognizable human like figures. The image takes on the parameters of a small painting or drawing with its 30" x 40" dimensions. The composition is similar to Blossom with its uncluttered composition that boasts a central focused, brightly colored foreground image atop a background of white canvas. Both Untitled of 1985 and Blossom are drawings that are hand painted with similar bold solid colors. However, the open composition of Blossom that continues off the four edges of the canvas is contrasted to the closed circular composition of human like figures in the Untitled drawing. The closed circle of figures in Untitled differs more sharply with the non-figurative, open composition of the Tate Gallery mural. AARON's coding has shifted from the production of non-figurative, open, monumental imagery in the 1983-1984 series of murals to smaller, more traditional dimensions in the 1985 Untitled that for the first time clearly contains human like figures.

Cohen made the human form, a dominant concern of western art history, a basic component in AARON's knowledge base. The human figures in Untitled can be likened to stick type imagery that is colored in. The more sophisticated imagery of the mural series has given way to forms that appear
to be made by young children, accenting a simplification in style that came with Cohen's move from canvas painting to his first hand painted computer image (please refer to Plate XIX). The introduction of stick like human figures, however, did not announce a simplification. It demonstrated a further complexity in AARON's growing knowledge base. AARON then possessed knowledge of how to draw the basic human figure. A larger central rock like shape forms the body torso, with a smaller and similar shape attached atop as a head, two stick-like arrows attached to the upper torso fashion hands and two from the bottom of the torso fabricate legs. The stick like bodies were then hand colored with bold, bright, flat, expressionistic color characteristic of Cohen's paintings since 1960. Cohen continued to expand AARON's knowledge base so that at this point it contains a more sophisticated understanding of how to draw people. This further expansion became manifest in Liberty and Friends (please refer to Plate XIV) and Athlete Series (please refer to Plate XV). Cohen, through his structuring of the computer artist AARON, can now explain, at least, how he goes about creating the human figure and uses the artist AARON to demonstrate this activity.
**People in Garden Like Settings**

During 1986 Cohen incorporated into AARON's knowledge base an understanding of trees along with the flora that we encounter in our living environments. An *Untitled* drawing of 1986 (please refer to Plate XVI) situates two standing human figures in a lush tropical garden. The smaller AARON drawing, 22" x 30", building on the human form developed in the works of 1985 and 1986, differs substantially from the monumental Tate Gallery mural where the large, diverse, boldly colored image dominates an entire Tate gallery space. The untitled drawing is comprised of delicate and detailed drawing of plants, flowers, trees and the two distinct full bodied people located in the foreground of a dense tropical garden. Whereas the Tate Gallery mural is loaded with color, the drawing has none. The small drawing concerns itself with a traditional classical Renaissance type representation, with a similar linear and compositional interest as Leonardo's *Adoration of the Magi*, begun in 1481. This consideration is manifested in AARON’s composition of two human figures located in a lush garden environment.

The *Untitled* hand painted drawing of 1987 (Plate XX) is a similar composition to the *Untitled* drawing of the same year. Five, more highly visible, human figures fill the foreground in a classical Renaissance Leonardo triangular composition with a dense tropical garden filling in the background. The 108" x 156" proportions of the painting are monumental when juxtaposed
against the 22" x 30" dimensions of the drawing. Cohen painted the larger image with color from his bright, flat, expressionistic palette. The monumentality, placement of frolicking human figures in a park like setting, and composition are reminiscent of Cezanne's The Bathers of 1892-1894. Cohen, the experimenting modernist, now appears to be Cohen the mannered classicist. What accounts for the immense structural difference between the painting Before the Event of 1963 and the Untitled painting of 1987?

Cohen realized that if AARON's knowledge base included an understanding of the visual environment in which the human exists and can render that in a fairly sophisticated drawing, then AARON can render a realistic image as prescribed by Albertian one-point linear perspective and the three dimensional ideal human form developed during the Italian Renaissance. And through AARON's development Cohen has worked out what he, and other humans, cognitively do in making visual representations in accordance with the Renaissance model of representation. Using his expertise in drawing and continuing with his expressionistic application of color, Cohen has structured in AARON's knowledge base what, and how much, an artist, or a program, needs to know in order to draw five figures in a botanical garden.¹⁵

¹⁵Cohen, "Implementing" 27.
This interpretation of AARON's imagery leads the viewer to an understanding of the objectives and abilities of the AARON program. As with contemporary structuralists, Cohen's concern does not lie with AARON's finished art object but in an investigation of human visual cognition and how its structuring yields meaning.\textsuperscript{16} If we then ask if the hand painted \textit{Untitled} of 1987 leads to a further understanding of how low level data from memory, whether in the human mind or in a computer program that patterns this mental activity, is used to build visual imagery, we can conclude that AARON duplicates and informs us, through this process, about cognitive activity. The structuring in the AARON program provides a model of the nature of representation that begins with basic art making activities of foreground/background, open/closed, insideness/outsideness, repetition, and symmetry that Cohen sees common to all cultures. To this basic knowledge Cohen adds in the AARON program a knowledge of plants, rocks, and human like figures that pattern his western understanding of art. Cohen's use of the five basic components contribute to understanding cross cultural art making. The location of cross cultural similarities for more sophisticated levels of art making, for example in the rendering of plants and human like figures that could be worked out in AARON's program, would give a stronger universal understanding of image formation than does the more limited western

\textsuperscript{16}Risatti 119.
approach of Cohen. The AARON program is Cohen’s continuing search for a better understanding of human image formation and Cohen confesses that AARON’s potential is an ongoing story. Cohen the modernist painter, through his program AARON, has become Cohen the art theorist.

**The Human Figure Takes Prominence**

Imagery by AARON of 1991 (first published in this thesis) concentrates on human like figures and faces. Untitled (Plate XXI) of 1991, AARON drawn and hand painted by Cohen, places two full bodied female figures centered on the canvas in front of a chinese red wall. The colorfully clad women, wearing blue and green v-neck sweaters over jeans, stand behind a brown topped table bearing a large green table plant rooted in a bright, oriental style blue planter. The two women, each with her chin in a raised hand, appear to be studying something located directly ahead of them and situated outside the painting. The packed composition of the 1987 Untitled painting has given way to a brightly colored and sparsely filled interior focusing on the two women and a single house plant. The transition from the crowded composition of five people in a lush tropical garden in Untitled to the clear, uncluttered delineation of two well formed females in an interior space is striking. The clarity of composition and form parallels a similar precision of abstract form and composition in Tribune (please refer to Plate I) of 1962.
PLATE XXI. Harold Cohen, Untitled, computer generated drawing, oil on canvas, 63" x 90", 1991.
Cohen is building a more sophisticated human figure with his recent expansion of AARON's knowledge base. AARON now knows how to render a sophisticated female figure.

This new augmentation to AARON's knowledge base and drawing capabilities is more clearly observable in another AARON drawn Untitled painting of 1991 (Plate XXII). The small image of only 20" x 25" is of two females. The females are not full bodied, for only shoulders and heads are represented against a solid chartreuse background. The two women of late twentieth century appearance have short cropped hair, with the blonde on the left wearing a deep periwinkle blue v-neck shirt, and the blue headed women on the right clad in an orange v-neck top. A comparison to the painting Untitled of 1991 reveals that AARON's knowledge base now constructs women with short cropped hair wearing v-neck tops. This small image differs in comparison to most of Cohen's and AARON's other computer generated imagery for the strong and uncluttered composition of two expertly drawn women against the flatly colored background comprises a commanding and striking image.

The small Untitled painting of 1991 is worthy of critical attention for it reveals what Harold Cohen's work of the last two decades has been about: the closer AARON's visual imagery duplicates classical representation, then the more successful AARON's program comes to providing a model of
western visual representation. Chapter Six will trace, through an analysis of Cohen's writings and interviews with him, what Cohen has to say about the nature of his art making.
CHAPTER VI

COHEN ON COHEN

Commencing with the catalogue for the University of Nottingham *Harold Cohen Retrospective 1956-1959*, Cohen has constantly written about his art making. To further illustrate the premise that Cohen continues Wittkower's inquiry of how the visual symbol in art yields meaning to the viewer, I will chronologically trace Cohen's writings and his thoughts expressed in interviews concerning the nature of his art making. I will posit a specific interpretation of the development of Cohen's ideas and the resulting imagery.
Beginning Questions

Writing has never been easy for Harold Cohen.\(^1\) Living, however, at the end of a century in which manifestos, for examples, the Futurist and Dadaist declarations, and artist statements, such those of Jackson Pollock and Barnett Newman, have accompanied the activity of art making, Cohen comments, and writes, about his art making. One of his earliest public statements came in the catalogue for the University of Nottingham Harold Cohen retrospective exhibition in 1959.\(^2\) In a discussion of his three year position as fellow in the Department of Fine Art at the University of Nottingham, Cohen expressed his view of the nature of art: "Art is concerned with discovery, and with new experience, not with reminiscence. The essential element in any work of art is that which has never been manifested before, and inevitably, the newness will prove unacceptable to those who have not followed the artist closely into the unknown."\(^3\)

\(^1\)Harold Cohen, personal interview, 14 February 1989.


\(^3\)Cohen, "Note" 6-7.
In 1963 Cohen wrote an introduction for the small catalogue of his one person show at the Robert Fraser Gallery, London. His concerns were more specifically focused on the processes of communication in painting, a reference to Wittkower's question, and an expansion on his view of the nature of painting.

It [painting] makes communication possible, and much of what is communicated is concerned with the mechanics and processes of communication. And where it is most meaningful, it questions most profoundly what may be meant by meaning. . . . It is what the painting is about that counts. . . . The painting is symbolic, necessarily, in the sense that a symbol is something which stands for something else. But I feel more and more strongly that the act of painting is itself symbolic; an act which stands for something else. What is symbolically enacted is bound up obscurely with the nature of the society within which it is accomplished. And finally it is what the act symbolizes which will determine the nature of the painting.

These ideas are continued in John Richardson's catalogue "Introduction" of the exhibition Harold Cohen Paintings 1960-1965 at the Whitechapel Gallery, London. This catalogue differs from the first two in that Cohen did not write a statement concerning the work; that was left to gallery director Bryan Robertson's "Preface" and Richardson's essay. In tracking the

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4See Cohen, foreword 2.
5Cohen, foreword 2.
6See Robertson and Richardson.
development of Cohen's painting during the five year period, Richardson used Cohen's statements to support and expand his points. He enlarged Cohen's discussion of the nature of painting and noted that for Barnett Newman, a friend and influence on Cohen, and for Cohen as well, "the act of painting becomes a symbolic act of responsibility." Richardson gave emphasis to Cohen's stress upon communication in the Robert Fraser exhibition essay.

Richardson noted a new point of concern arising in the first half of 1960s that manifests itself in the well known paintings Tribune, Before the Event, and Pastoral. Cohen began discussing meaning and the semantic structure of the work, a more overt focus on his investigation of Wittkower's inquiry.

The range of meaning available to the artist is largely determined by the semantic structure of the work, and major modifications in meaning can only be accomplished by modifying this structure. If I use a dotted line to indicate 'cut here' in a context where the instruction is reasonable and non-contradictory, then the meaning is unambiguous. If I use the same mark, with the same instructional associations, but either by modifying the context, or by any other means make it clear that the same meaning is not intended, then another dimension of meaning becomes available. . . . I suspect that unlike objects, the marks which are the raw material of painting have no normal context. They have only what the painter gives them. I am talking about the

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7 Richardson 10.

8 Richardson 11-12.
Richardson observed that by the end of 1963, and apparent in the painting *Before the Event* of 1963, Cohen had begun focusing on Wittkower's question of interpretation and the implied paradox. In concluding his article on the "Interpretation of Visual Symbols" in which he considered the limitations of interpreting visual symbols in the arts, Wittkower restated his principal concern. "My principal question was -- to summarize briefly -- how far statements about the 'what', the 'how' and the 'why' are capable of being tested." He emphasized that concern in interpretation "is no longer description and classification, but investigation of function and meaning." Cohen, in a discussion of the painting *Before the Event*, continued this deliberation.

I had been much concerned with the problem of interpretation, and the apparent paradox it implied. For, though the artist has no way of knowing what the spectator sees in the painting -- and the essential differences of genetic structure, environment, predispositions and so on make it quite certain that he will not see the same as the artist sees: nonetheless, there is evidently an act of

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9Richardson 12-13.
10Richardson 14.
11Wittkower 187.
12Wittkower 187.
communion brought about by the painting. I did not believe that the artist's function was merely to provide the spectator with raw, and random, materials for his own artistic activity.\textsuperscript{13}

Cohen continued with the idea of an image of what the mind must be like, asking how it incorporates the perception of a painting, and suggested the idea of "the field of the mind," somewhat analogous to a computer with "its memory bank arrayed on a field, rather than stored in an index."\textsuperscript{14} Thus, the material in the field and the interconnections from person to person would vary, however, "the general pattern of circuit-building and of incorporating new material would not."\textsuperscript{15} "What was special about the material in a painting was that it would not only contain information new to the spectator - absent, that is, from the field of his mind - but it would also contain information regarding its own incorporation; its own wiring instructions, so to speak."\textsuperscript{16}

\textsuperscript{13}Richardson 14.

\textsuperscript{14}Richardson 14.

\textsuperscript{15}Richardson 14.

\textsuperscript{16}Richardson 14.
The Computer and the Question of Structure

From 1966 to approximately 1970 Cohen's discussion centered around an investigation of color. Shifting focus from the problem of drawing that had been central to his work from the Slade days, Cohen wanted to learn what color is about, rather than giving emphasis to its decorative use. In the early 1970s, paralleling his move to experimentation on the computer, Cohen's comments returned to structure and the art work. "I started by using the computer to provide explicitly structured formats for certain color games; and came to recognize only gradually, and perhaps even a little unwillingly, that I found the structural aspects altogether more absorbing than the color itself." His move to the computer was precipitated by his frustration with painting and the fact that after twenty years he "did not know anything more about painting than when he started. . . . It has to do specifically with notion of representation in the very broad sense of making marks that other people believed to have meaning, that is 'stand for' things. After all those years it did not seem to me that I was approaching anything like a theory of

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18 Cohen, Harold Cohen Paintings and Screenprints 2.

In January-February of 1972 the Los Angeles County Museum of Art hosted the first West Coast one-person show of Cohen's machine generated drawings in the exhibition "Three Behaviors for the Partitioning of Space." Maurice Tuchman notes in the introductory catalogue essay that from 1969 to 1972 Cohen had used the computer "to solve particular problems in his painting—problems of color relationships, color distribution, and the partitioning of topographic space on the canvas surface." The three main groups of work involved in the partitioning of space were contour maps, territorial maps, for example, Labeled Map of 1969, and mazes. Cohen, in his catalogue statement, discussed the relationship between formal painting, color, and structure depicted in the imagery. In a review of the exhibition works he noted that the formal painting problems in the works reflected his own preoccupations. He pointed out that his initial use of the computer was to structure formats for color games, however, he found the structural aspects more engaging than color.

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21 Maurice Tuchman, preface, Three Behaviors for the Partitioning of Space, (Los Angeles: Los Angeles County Museum of Art, 1972) 2.


23 Cohen, Three 2-3.
Three months later in the May-June 1972 issue of *Art in America* Cohen articulated his view and use of the computer for art making in a response to Robert E. Mueller's article "Idols of Computer Art." Mueller described the computer as a black box, that is, a device whose workings need not concern the user. Cohen opposed Mueller's view of the computer suggesting another possibility for its usage by artists. Following Cohen's endorsement of artists using "the most powerful tool ever invented by man," and his harsh critique of the triviality of so-called "computer art," Cohen observed that "while it actually handles numbers, those numbers can function symbolically; it is a general-manipulating machine, capable of dealing with any schema which tends to symbolic (not merely numerical) representation." The computer, he continued, has a special ability: "... that logical structures of great complexity may be built from this primitive decision-making ability, and that these structures will have characteristics very like those of human logical structures." The machine can be used by the artist not only to simulate the appearance of his work, but also the decision-making processes, and thus give the artist greater insight, "... via the objects he makes, into the structure of

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26 Cohen, "Computer" 31.
his own personality and his own universe.\textsuperscript{28} He continued, "the artists of
the Renaissance did not invent perspective in order to examine the appearance
of the world, but to examine themselves examining it."\textsuperscript{29}

Two years later in an article entitled "On Purpose: An Enquiry into the
Possible Roles of the Computer in Art," Cohen searched out possible uses of
the computer in art making.\textsuperscript{30} In his examination Cohen noted that "the
significance of the question would seem to point to the notion of Purpose
rather than purposes, implying, if not a hierarchical structure with Ultimate
Purpose sitting on top as its informing principle, certainly a structure of some
sort which RELATES all of an artist's individual purposes."\textsuperscript{31} Cohen
speculatively suggested "that the use of the machine might be considered to
advance the artist's Purpose if, . . ., it could be seen that this use might itself
generate, or least update, an appropriate notion of structure."\textsuperscript{32} He observed
that the computer as a general-purpose symbol-manipulating machine "is
capable of dealing with any problem which can be given a symbolic

\textsuperscript{28} Cohen, "Computer" 31.
\textsuperscript{29} Cohen, "Computer" 31.
\textsuperscript{30} Harold Cohen, "On Purpose: An Enquiry into the Possible Roles of the
\textsuperscript{31} Cohen, "On" 9.
\textsuperscript{32} Cohen, "On" 10.
In the same year, in the article "The Meaning of Meaningful Images," Cohen returned to the problem of interpretation with its apparent paradox that he had discussed a decade earlier in relation to the painting *Before the Event.*\(^{34}\) In considering further how an art work communicates something to the viewer, he asserted:

...It is my profound belief that what is central to art is the business of making things that stand for other things, and that the permanent and ubiquitous nature of art rests, not upon the fact that all men are sensitive to beauty, but upon the fact that the human mind itself functions symbolically. Thus art is in its very essence about the human mind.\(^{35}\)

In making things stand for things, which Cohen views as assigned meaning rather than an intrinsic meaningfulness, he observed that in the very early stage of mark making, for example, petroglyphs, "...the marks appear to have proceeded independently of the desire to communicate meanings."\(^{36}\) Although the maker and the viewer, argued Cohen, possess a pre-cultural reference point, a set of marks made by one person to "stand for something."

\(^{33}\)Cohen, "On" 10.

\(^{34}\)Harold Cohen, "The Meaning of Meaningful Images," invited paper for a symposium of the Center for Advanced Visual Studies, Massachusetts Institute of Technology, 1974; and Richardson 14.

\(^{35}\)Becky Cohen 7.

\(^{36}\)Becky Cohen 7.
could be read by another with a analogous meaning structure. He proposed:

... it might be more reasonable to consider meaning being GENERATED in the first place by the marks, generated in the course of their transaction with each individual viewer, than to consider them as being carried to the viewer, by the marks, from the maker.

Cohen observed, as did Wittkower in his essay on the "Interpretation of Symbols," that the history of image making has been concerned with INTENTIONAL meanings, which are rarely available to us, "since the degree of their availability is determined solely by the relative remoteness of their cultural provenance from our own."

Tracking down these intentional meanings, unravelling the curious ways in which they change as the images which carry them cross cultural boundaries, provides a fascinating detective game, and one of the most exciting aspects of art history. But if we choose to attend to the more primitive of the two structures—what I will call the ASSOCIATIONAL meaning,—if we decide to view the artist not as a designer for meaning generators, then psychology has more to offer than art history... because we will certainly need to seek those common pre-cultural points of reference, which make the artist's function so possible, IN MIND

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37 Becky Cohen 7.
38 Becky Cohen 8.
39 Becky Cohen 8; and Wittkower 175-177.
ITSELF.\textsuperscript{40}

Working out of Wittkower's analysis, Cohen laid out his proposal for meaning generation using the computer. "I think it can be demonstrated that what we know of the normal processes of the mind, of the ways in which the human being relates physically, perceptually, and psychologically to his world, is itself enough to account for the production of images which generate meaning to the viewer, and that it does not require the presence of intentional meaning for this production to occur."\textsuperscript{41} Further, "I think . . . that the exercise of behaviour consistent with this knowledge will produce meaning-generating images even if that behaviour is being exercised by a machine model, rather than by a human being."\textsuperscript{42}

Three years later Cohen was invited to participate in Documenta VI of 1977 with an installation of his computer generated imagery. The installation included a "turtle," driven by the AARON program, moving atop a canvas or paper surface and generating line drawings. The Documenta showing was riddled with machinery problems for the "turtle," fed from an electrical system that serviced ground pumps of a nearby park, continually crashed. Cohen and the turtle moved on to a showing at Amsterdam's Stedelijk Museum from

\textsuperscript{40}Becky Cohen 8.

\textsuperscript{41}Becky Cohen 8.

\textsuperscript{42}Becky Cohen 8.
November 1977 through January 1978. The exhibition catalogue was made up of a series of questions and answers by Harold and Becky Cohen. In his response to the question "Why is computing valuable to you?" Cohen explained:

Of course, the machine is only valuable to me in relation to what I want to do with it, which has to do with long-standing preoccupations about the nature of image-making. For example, as an artist I am able to make some marks on a piece of paper, and the viewer may say, 'that's a face,' when we both know the difference between a face and a few marks on a piece of paper perfectly well. Can you imagine a transaction more fundamental to art? I spent a long time as a painter trying to grasp what I was actually doing to initiate and control it.

What the computer provided was a way of externalising, stabilising my speculations about image-making behavior: not only my behavior, but what I thought I could see operating in drawings generally, and especially in children's drawings and in so-called primitive art. One is able to test one's speculations. What I do with the computer is called 'modelling' in science. A model is a limited dynamic description, a simulation, of a complex system, which can be run on a computer in order to see whether it behaves like the system itself to be considered adequate. In this case, the simulation seems adequate to the degree that most people have some difficulty believing that the drawings were actually made by

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Cohen noted in the same interview that his work with the computer has never been obsessive, and that he came to computing not through the route of art and technology, "but as a painter and with many of my most fundamental preoccupations intact."\textsuperscript{46}

In the September 1978 \textit{Art in America} interview with Moira Roth, Cohen clearly articulated that his art making on the computer concerns the generation of meaning and its relation to the viewer.

... what I am trying to point out is that much of what is fundamentally important in art rests precisely on the audience's ability to read images. What I mean is that the propensity to generate meaning, to associate meanings with marks, is something the viewer shares with the artist. A large part of what we value in art is not the ability of the artist to communicate special meanings, but rather the ability of the artist to present the viewer with something that stimulates the viewer's own propensity to generate meaning. The propensity to invest events with significance may be one of the most fundamental attributes of the human mind, and I suspect that art draws much of its power directly from its reliance upon this attribute.\textsuperscript{47}

\textsuperscript{45}Harold and Becky Cohen 4.

\textsuperscript{46}Harold and Becky Cohen 5.

To his continuing investigation of Wittkower’s inquiry, Cohen added a new dimension. He suggested that not only does a visual structure beget meaning to the viewer, but that the viewer then continues the process through his or her own capacity to generate meaning. He views this capability of investing events with significance as a basic attribute of the human mind.\(^{48}\)

**A Theory of Representation**

By 1979 Cohen’s investigation of how structure begets, that is generates, meaning led to the beginning formulation of a theory of representation presented in his paper "What Is An Image?" delivered at the 6th International Joint Conference on Artificial Intelligence in Tokyo.\(^{49}\) In the paper abstract Cohen pointed out that image-making, and in particular art-making, "are considered as rule-based activities in which certain fundamental rule-sets are bound to low-level cognitive processes."\(^{50}\) His software computer program, AARON, modeled aspects of image-making behavior in the activity of these rules, and generated non-duplicating freehand-type drawings.\(^{51}\) The paper

\(^{48}\)Roth 107.

\(^{49}\)See Cohen, "What" 1028-1057.

\(^{50}\)Cohen, "What" 1028.

\(^{51}\)Cohen, "What" 1028.
explained the AARON program, its theoretical basis with regards to cultural considerations and in particular more remote cultures, its implementation in an art-museum environment, and the randomness function (unpredictable choice outcome) in the program. He noted that the conclusions offered in his developing theory of image-making "bear upon the nature of meaning as a function of an image-mediated transaction rather than as a function of intentionality," and that "they propose also that the structure of all drawn images, derives from the nature of visual cognition." He offered in the paper's conclusions "a number of propositions concerning the nature of evocation and the nature of the transaction — the making and reading of images — in which the evocation occurs."

Cohen explained the hypothesis of his developing theory in the section of the paper entitled "Cognitive Bases for Image Structure."

In short, my tentative hypothesis in starting work on AARON was that all image-making and all image-reading is mediated by cognitive processes of a rather low-level kind, ... In the absence of common cultural agreements these cognitive processes would still unite image-maker and image-viewer in a single transaction. On this level — but not on the more complex culture-bound level

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52 Cohen, "What" 1028-1057.
53 Cohen, "What" 1028.
54 Cohen, "What" 1028.
55 Cohen, "What" 1039.
of specific iconological intentionality -- the viewer's egocentricity might be justified, since he could correctly identify cognitive processes of a familiar kind in the making of the image. . . . I am not proposing that processes make it possible for us to understand the intended meanings of some remotely-generated image: I am proposing that the intended meaning of the maker play only a relatively small part in the sense of meaningfulness. That sense of meaningfulness is generated for us by the structure of the image rather than by its content.  

Cohen continued the discussion of this section, noting that his attempt was "to identify some of the determinants to a general image-structure which could be seen to be common to a wide range of enculturating patterns." Thus, the minimum conditions for generating meaning do not need to include the assumption of an intent to communicate, however, he suggested that an appropriate set of cognitive processes would "be sufficient to generate a sense of meaningfulness." The next section in the proceeding explained the beginning cognitive skills that AARON employed to generate meaning. The 1979 paper established a beginning theory of representation on which Cohen continues to expand and build, proposing an hypothesis for Wittkower's query of how the visual symbol yields meaning to the viewer.

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56Cohen, "What" 1039.
57Cohen, "What" 1039.
58Cohen, "What" 1039.
59Cohen, "What" 1040.
Cohen's writing during the 1980s has been mainly theoretical, elaborating for visual arts and artificial intelligence audiences the development of the AARON program that continues to serve as a working model for his theory formation. In 1983 Cohen discussed the AARON project in a Tate Gallery catalogue essay for the exhibition "Harold Cohen," an exhibition held at the De Cordova Gallery in Lincoln, Massachusetts, and the Brooklyn Museum prior to its Tate showing, and with showings at the National Museum of Wales, Cardiff, and at the Arnolfini Gallery, Bristol, England.\(^\text{60}\) Cohen, continuing the focus of the 1979 paper, asked the question "What do artists do when they make images?"\(^\text{61}\) In response he noted that "we are in the domain of beliefs, now, not in the domain of facts," and explained that "the most informative thing to be known about AARON is, not what it is like, but what beliefs concerning image-making - more generally, concerning art - have determined what it is like."\(^\text{62}\) He continued:

I want to propose that art is fundamentally representational: a work of art stands for something which is not present to the viewer in the same sense that the work itself is present. . . . we should view a representation as a set of assertions about the world rather than as a transformation of the world onto a flat surface. In


\(^{61}\) Cohen, introduction 10.

\(^{62}\) Cohen, introduction 10.
short, what I mean by representation proceeds from the inside out. . . . It is the continuous building of the deeply buried raw material of belief into increasingly complex mental structures, and sometimes - only rarely, perhaps - into completely externalised, physical ones.

This is a view of normal mental functioning, of course, not specifically of art-making. Art making figures primarily as a final externalising stage, essentially continuous with the wholly internal phases of mental imaging. The point is not that the physical product of all externalising is art: it is simply that art rests upon normal faculties. . . . For the culture, and on its behalf, this expertise is turned to the playing of a sophisticated game around the fact that, in the mind, things stand for other things. Art is a celebration of the mind itself. . . .

As Cohen proceeded in the building of a theory of representation in model AARON, he continued to emphasize points that he had been stressing for two decades: that things in the mind stand for other things, and that these are externalized in image-making. These two ideas are basic components in his view of image-making and the generation of meaning.

In 1984 the exhibition "Harold Cohen: Computer-As-Artist" opened, not in a museum or gallery, but in the Buhl Science Center in Pittsburgh. Cohen wrote the "Introduction" to the exhibition catalogue, which included also essays by Herbert A. Simon and Michael Compton. He deliberated over the

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^Cohen, introduction 10-11.

differences between art and science, reviewing his computer generated art making activity that is a part of both. At the end of the essay he clearly stated what his work is about, again demonstrating the link of his use of artificial intelligence in image-making to his exploration of Wittkower's question. "I . . . saw the field of artificial intelligence as an unexpectedly powerful way of examining what happens when human beings make images which seem to communicate to other human beings. I am not trying to 'explain' art. I am examining my own belief that art is made through the exercise of normal functions, . . . , and trying to find something about what those functions are and how they are used."⁶⁵

Theoretical Papers

Along with the building of the AARON model and the exhibition of his art, Cohen has been invited to write and give theoretical papers that discuss his art making. Since the mid 1980s invitations from members of the artificial intelligence community have resulted in a series of papers in which Cohen discussed his art making in relation to the artificial intelligence paradigm and the computability of art. In 1987 Cohen was invited to present a paper at the 1st International Symposium on Artificial Intelligence and Expert Systems, a

⁶⁵Cohen, introduction, 1984, 11.
May conference to be held in Berlin. He wrote the paper entitled "Implementing an Expert Artmaking System," that, however, was not delivered. In the introductory remarks Cohen established what his current investigation was about by commenting that he considered his earlier work to fall within the domain of art history, and that the implementation of his own art making system embodied in program AARON constituted his present activity of elucidating on "some very general aspects of what people do when they make images." This distinction emphasized his viewpoint that "the essence of art resides in the making, not in the object." His paper contained two parts: the first concerned "what I believe art to be and what I believe the expertise of artmaking to be," thus explaining partially why AARON is the way it is. The second explained how AARON implements the expertise of art making.

In his discussion of AARON's evolution Cohen described how model AARON proposes an answer to his question of how structure generates meaning.

At the outset AARON's structure reflected my preoccupation with a puzzle that had been with me for many years: how it is that we were able to

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66Cohen, "Implementing" 5.
67Cohen, "Implementing" 5.
68Cohen, "Implementing" 5.
69Cohen, "Implementing" 5.
make sense of systems of marks generated within cultures utterly remote from our own, the cultural meanings of which we could not possibly know. For that matter, how are we able to make sense of any marks at all? I speculated that we would need to distinguish between meanings carried by mark systems and the sense of meaningfulness generated by those systems.\(^9\)

He continued by noting that meanings of transmitted messages have less presence the more distant they become from their origins, however, a sense of meaningfulness "must be generated through non-cultural commonalities between mark-maker and mark reader."\(^7\) With this consideration in mind, Cohen notes that we know little about how or why or by whom the California desert petroglyphs were made, however, he says, let us suppose that a computer program made them.\(^2\) With this supposition in place, we then ask what would the program "have to know to persuade us that its efforts were meaningful?"\(^3\) In answering this question Cohen proposed a solution to Wittkower's inquiry.

I concluded that the non-cultural commonalities I sought resided in the cognitive system, which I assumed to have been essentially constant throughout human history. Thus the first versions of AARON represented my attempt to identify,

\(^9\) Cohen, "Implementing" 16.

\(^7\) Cohen, "Implementing" 16.

\(^2\) Cohen, "Implementing" 17.

\(^3\) Cohen, "Implementing" 17.
and simulate the actions of, a small set of what I thought of as cognitive primitives -- closure, insideness, repetition and division, for example. I suspected that if the viewer could be convinced that AARON's marks were generated by an entity not unlike himself, that he would then provide the meanings to account for the drawings being the way they were.74

Cohen concluded his discussion on the implementation of AARON as an expert artmaking system with the observation that changes in the program have come about in response to his changing conceptual needs, which, in turn, have changed his view concerning "the nature of representations and the significance of making them."75

In August of 1988 Cohen presented an invited lecture entitled "How to Draw Three People in a Botanical Garden" to the annual meeting of the American Association for Artificial Intelligence. Cohen opened the presentation by noting that this paper constituted an updated version of the AARON program first reported on at the 6th International Joint Conference on Artificial Intelligence. The opening sentence of the paper abstract summarized the objective of the computer program: "AARON is a program designed to investigate the cognitive principles underlying visual representation."76 Cohen restated clearly the question that has directed his

74Cohen, "Implementing" 17.
75Cohen, "Implementing" 36.
76Cohen, "How" 846-855.
work with the computer: "What do computer programs -- and, paradigmatically, human beings -- need to know about the external world in order to build plausible visual representations of it. What kind of cognitive activity is involved in the making and reading of representations?" In the paper Cohen laid out his findings that gave a resolution to his question. He noted that the making of representational objects provides the only directly examinable evidence of "visual imagining." I mean," continued Cohen, "those internal cognitive processes that underpin and inform the making of representational objects, and which we all enjoy to some extent, whether or not we make representational objects. I assume that the reading of representations involves essentially similar processes." He observed that prior to 1980 AARON generated highly evocative imagery, although functioning as a limited model of human cognition embodying few cognitive primitives. This observation led Cohen to conclude that:

experiential knowledge, inevitably less than constant across a culture and far less so between cultures, is less a determinant to the communicability of visual representations than is the fact that we all share a single cognitive

77Cohen, "How" 848.
78Cohen, "How" 848.
79Cohen, "How" 848.
80Cohen, "How" 848.
Thus, according to Cohen, we all share a single cognitive structure.

In a discussion of the current version of the AARON program, Cohen noted that "given adequate knowledge of the representational procedures themselves, there is virtually no lower limit of world-knowledge below which representation is impossible. The goal, rather, is to discover HOW representational structures represent WHAT they represent: how we use what we know to build those structures." In his 1988 paper "The AI Paradigm," an invited paper for the First International Symposium on Electronic Art, Cohen summarized the purpose and accomplishment of the AARON program.

AARON has been under more or less continuous development for about fourteen years, while its involvement with the appearances of an external world has occupied only the past three. Prior to that time my reasons for writing the program had to do with discovering the basis and the architecture of evocation; with understanding what "meanings" could be generated by drawings explicitly in the absence of real-world reference.

Cohen's current interests, delineated in the 1990 paper "The Computability of Art," center on technical considerations involving computer programs with greater levels of autonomy, which, in turn, lead to a re-

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81Cohen, "How" 848.
82Cohen, "How" 850.
consideration of how we think about art. He looks to this possibility for AARON, moving beyond the present symbiotic relationship of collaborating artists Cohen and AARON. He does not lose sight, however, of the underlying premise of the AARON program and his art making.

The exercise of the higher intellectual functions, whether in mathematics or art, poetry or microbiology, requires the possession, not only of enormous quantities of knowledge, but of an architecture which binds that knowledge into a coherent world-view, and gives meaning and accessibility.

Conclusion

Harold Cohen, in lectures and articles, has continually discussed his art making. From his first catalogue essay for the University of Nottingham Harold Cohen Retrospective 1956-1959 through contemporary papers on the AARON program, Cohen has spoken about his work in articles, interviews, telephone conversations, and invited papers. Although he confesses to have difficulty with writing, he has been willing continually to inform the visual arts community, and now the artificial intelligence community, about the

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84 Harold Cohen, "The Computability of Art," 1990, unpublished, is currently being revised by Cohen.


86 Cohen, "The Computability" 14.
ongoing developments in his art making. Cohen has written an essay for each exhibition catalogue of his work, with the exception of the Harold Cohen Paintings 1960-1965 catalogue.

This body of literature attests to and supports the thesis that a central preoccupation driving Cohen's art making is Wittkower's query of how the visual symbol in art yields meaning to the viewer. Cohen's concern questions how visual structure communicates, or generates, meaning to the viewer. His writing in the early 1960s considered processes of communication. This question led Cohen to consider a theory of representation, a possibility not found through his painting. Thus, he moved from art making on canvas to art making with the computer, building a theory of representation of how structure generates, that is, yields meaning through the development of the software program AARON.

Now almost two decades old, AARON provides a model of image making that proposes an approach to demonstrating how cognitive structure, or architecture, generates meaning to the viewer. Through the computer and program AARON, Cohen has built a theory of representation that simulates human cognitive activity in art making. Beginning with what Cohen identifies as the primitive cognitives, that is, basic non-cultural commonalities to art making constant throughout human history namely, foreground/background,

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Cohen, personal interview, 14 February 1989.
closure/non-closure, insideness/outsideness, repetition, and symmetry, Cohen programmed AARON with these basic art making principles. In the course of his investigation Cohen added to the primitive cognitives object specific knowledge (heads, hands, arms, trees, plants, rocks, etc.) of how people are constructed and how they move, along with morphological knowledge of plant growth. The programming and drawing of computer artist AARON demonstrates what an artist needs to know in order to draw from basic to sophisticated levels, from the rendering of scribble and surround child-like forms to more expertise renderings of the human figure. The simulation of human activity in the computer program enables examination, self-reflection, and perhaps, new understanding about art making that individual artists cannot observe in relation to their own art making activity. Cohen has provided with AARON a route through which he is able to demonstrate how visual structure (mark making) comes about, and suggests that marks made through non-cultural commonalities between mark-maker and mark reader generate meaningfulness.

In Chapter Seven I will draw conclusions concerning the implications of Wittkower’s query on the art making and the art reading of Harold Cohen’s imagery.

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88Cohen, "How" 846.

89Cohen, "Implementing" 16.
CHAPTER VII

CONCLUSION

This dissertation presents the art making of Harold Cohen as a unified whole. This interpretation contrasts sharply with views of Cohen that vary from critical acclaim of his abstract expressionistic field paintings by modern formalist critics to endorsement by the artificial intelligence community of his expert system drawing machine AARON. My interpretation aligns Cohen with Rudolph Wittkower’s concern to discover how the visual symbol (mark) yields meaning to the viewer and provides an underlying link that joins the seemingly separate stages in Cohen’s art making.

This interpretation can be substantiated by tracing Cohen’s research on how visual structure (mark making) generates, or yields, meaning to the viewer. His investigation began during his student years at the Slade School of Art while under the influence of art historian Wittkower, continued throughout his years of artistic acclaim in the 1960s, and led to the
development of the computer artist AARON. This theme is examined from the different angles presented in this study: Cohen as a modernist painter, Cohen's transition from canvas to computer and the development of the AARON program, the critics's views of Cohen's work on canvas and computer, my examination of Cohen's imagery on canvas and computer, and Cohen's discussion of his work. The findings support the interpretation that a main concern of Cohen's art making, the investigation of how structure generates meaning to the viewer, arises out of Wittkower's inquiry. We have observed how Cohen's exploration of surfaces in the organic expressionist field paintings of the 1960s, and his dissatisfaction with this direction led to an intellectual restlessness. He sensed that although he had been painting for twenty years he did not know much more about painting than when he began. His interest was with notions of representation in the broad sense of making marks that other people believe to have meaning, and this led him to seek out a way to build a theory of representation that explains this activity. His serendipitous introduction to computer programming led to the subsequent realization that the computer, in conjunction with ideas about artificial intelligence, could provide an avenue through which he could build a theory that explores the question of how visual structure (mark making)

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1 Harold Cohen, personal interview, 17 November 1986, 17.

yields meaning to the viewer.

His software program AARON embodies his developing theory of representation. It is built on the assumption that all humans share similar basic cognitive principles which also shape the beginning stage of human art making. The next level of art making embodies representations of things that we observe about us, for example, plants, rocks, and people. AARON has developed to the point where he can simulate these human art making activities. AARON is based on the scientific concept of "modelling," that is, a simulation of a complex system that can be run on a computer in order to observe whether it behaves like the system it is to simulate. We can agree with Cohen's argument that since people have difficulty believing that the computer program made the art that the AARON model has had a measure of success.

My interpretation of Cohen holds implications for other issues that arise from Cohen's art. First, a unified viewpoint gives a different understanding of Cohen than has been put forward, thus far, in art historical and art critical writings. Second, close examination of Cohen's discussion of his work reveals a heavy emphasis on the art making process, in contrast to a modern formalist concern with the art object. Third, Cohen's investigation of image-making, the

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3Harold and Becky Cohen 4.

4Harold and Becky Cohen 4.
process of the structuring of imagery, is important for those teaching about the making and reading of imagery in the field of art education, whether it be studio activity, or concerns of aesthetics, art history, or art criticism, because the AARON model exhibits principles that are somewhat similar to principles artists use in shaping art. The early stage of the program simulated actions that Cohen found basic to mark makers from different cultures, and thus non-cultural and apparently non-gender specific. He labelled these basic cognitive skills: the ability to differentiate between figure and ground, between open and closed forms, and between insideness and outsideness. To this basis Cohen added repetition and division. In later stages of the program, he incorporated further his own Slade training in programming AARON with capabilities to simulate plants, trees, rocks, and the human figure. This stage incorporates a cultural and gender specific viewpoint that has come to be labeled as the western, white, male view of art. An awareness and understanding of the principles embodied in the AARON model can assist those teaching about the making of all visual imagery as well as those teaching about the reading of imagery for it delineates, in its basic stage, a cross-cultural process of image making, and at its advanced stage it alerts us

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5Cohen, "What" 1040.
6Cohen, "Implementing" 17.
7Cohen, "Implementing" 17-27.
to biases incorporated in our western approach to art. Fourth, Cohen's exploration of image making, a concern central to art making and the discussion and recording of art making in art criticism and art history, demonstrates a valid contribution to art knowledge and therefore validates, in the particular case of Harold Cohen, the inclusion of his computer related art in the discourse on contemporary art.

A Unified Art Historical Reading

One of the problems plaguing a richer understanding of Harold Cohen's art making has been the separation of his renowned abstract paintings from the later imagery generated by computer drawing machine AARON. This split is noted by Alan Bowness in his comments in the 1983 Harold Cohen Tate Gallery exhibition catalogue.\footnote{Bowness 5.} Bowness makes a sharp distinction between Cohen's abstract works, two of which are owned by the Tate Gallery, and Cohen's move to California and introduction to the computer.\footnote{Bowness 5.} Because of this move, Cohen lost contact with the English visual arts community.\footnote{Bowness 5.} A comparison of critics writing about the abstract works with those discussing
the computer generated works illustrates this distinction. This differentiation gives rise to a problem labelled by historians as a gap in the literature.¹¹

This gap in the art historical recording of Cohen's art making is due in part to the emphases of modern and contemporary art history. Modernism, the location of Cohen's abstract expressionist field works, gave a formal Greenbergian interpretation of his works, criticizing the formal elements and expressionistic quality. Cohen's works from 1958 through 1968 fit this form of analysis well as demonstrated in the discussion of Chapter Five. With his move to California and transition to the computer, his former appreciative public was confounded on two levels. First, Cohen physically removed himself from their presence and their ongoing critical commentary. Second, Cohen's computer generated imagery requires a type of critical analysis that takes into account both the imagery and the computer hardware and software systems (including a computer mouse drawing imagery on canvas). Although Greenbergian modernism works well enough for the interpretation and evaluation of Cohen's paintings, it is not as helpful in an analysis of computer artist AARON and its image production. Greenberg's aesthetic, which emphasizes visual form, misses the purpose of AARON and the resulting computer generated imagery. In addition, there was no basis for the inclusion

¹¹An observation by The Ohio State University history professor John Rothney in a review of the differing art historical treatments given Cohen's abstract paintings and computer generated imagery.
of computer generated imagery in the art historical canon of the early and mid 1970s, and thus no base for analysis. This seeming dilemma, brought about by art works that appear to be quite different, has lead to the separation of Cohen's art into two groupings, resulting in a historical gap in the literature.\textsuperscript{12}

My interpretation provides a resolution to the historical gap problem. It discovers an underlying premise operating throughout the body of his work. This approach, examining original, internal, and external contexts, recognizes the deeper questions and concerns that pervade the body of Cohen's work, rather than emphasizing a formalist reading that stresses appearance.

\textbf{An Emphasis on Process}

One of Cohen's constant concerns has been with the process of art making. A focus on process provides a view of art making that is not primarily concerned with the art object. It gives an emphasis to the art making process incorporating Cohen's concern of how the structuring, that is, the making of an image, yields meaning. A study of Cohen's writings uncovers this ongoing consideration. In his introductory statement for the

\textsuperscript{12}Note, for examples, Bowness's distinction, foreword, 5; Herbert A. Simon's discussion of artist and the computer, 14-16; and James Burr's deliberation in his \textit{Apollo} review, 507.
1963 Harold Cohen exhibition at the Robert Fraser Gallery, Cohen asserted that "it is what the act of painting symbolizes" that determines the nature of painting.\textsuperscript{13} This stress on process remains constant throughout Cohen's commentary on his evolving work. The initial report of the AARON project for the 1979 International Joint Conference on Artificial Intelligence is entitled "What Is An Image?" and in his introductory remarks Cohen stated that "the motivation for this work has been the desire to understand more about the nature of art-making processes than the making of art itself allows."\textsuperscript{14} In a discussion of the AARON program in 1986 Cohen asserted that "I write programs which are intended to throw some light upon what people do, in a cognitive sense, when they make images: not upon what their images look like. Art is a series of acts, not a series of objects."\textsuperscript{15}

In a current article "The Computability of Art," written in 1990 and presently under revision for publication, Cohen focused on the "unquestioned assumption that the essence of art lies in the appearances of works of art."\textsuperscript{16} In response, he argued that one must go beyond appearances "to what can be inferred about the principles that engender appearances."\textsuperscript{17} In his work with

\textsuperscript{13}Cohen, foreword, Harold Cohen 1.
\textsuperscript{14}Cohen, "What" 1028.
\textsuperscript{16}Cohen, "Computability" 2.
\textsuperscript{17}Cohen, "Computability" 3.
AARON, he asks in relation to the computability of art, if a "computer program can exhibit principles that are in some important respects like the principles which shape human art?" Cohen's focus on process, looking to the principles that structure human art making, came about in his endeavor to resolve and expand his understanding of Wittkower's question, and is the key to a unified interpretation of the body of his work.

Implications for Art Education

The question of how the visual symbol yields meaning to the viewer that resurfaces with Wittkower and that Cohen addresses through a developing theory of representation embodied in the drawing program AARON is a question artists have asked for millennia. Wittkower's inquiry, giving rise to Cohen's proposed resolution in the artificially intelligent AARON program, a program that models what the artist does thereby constituting a representation of the artist's representational acts, elucidates an important question of art makers and art educators, and those who develop theory concerning art and how to teach others about art making and art reading. These two activities, the making and reading of visual imagery, comprise the main concerns of teaching how to teach about art.

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18Cohen, "Computability" 4.
Cohen's 1979 paper "What Is An Image?", an explanation of computer program model AARON, dealt with concerns that are primary for those teaching about the teaching of art. As a young field looking to other disciplines for the development of theory, art education borrows and expands theory based in other fields, such as education, the visual arts, philosophy, and psychology. Cohen's model for image making developed through an interdisciplinary link with computer science and in particular with artificial intelligence. In the case of Cohen's model, theory from the informing disciplines of art, computer science, and artificial intelligence are incorporated into a strategy that can inform further approaches to art education. For instance, a program that instructs students in art making by utilizing a representation of the artist's representational acts rather than a program that merely emulates the objects that artists make could provide a strong instructional strategy for art educators. The AARON model presents insight into the nature of art making processes by providing through computer artist AARON an example of what an artist does in making art, beginning with the "basic cognitive principles" of figure/ground, closure, insideness/outsideness, repetition, and symmetry, and advancing to a more sophisticated level in the rendering of the human like figure.\textsuperscript{19} We can view, at arm's length, computer artist AARON's art making through the program code, a hidden

\textsuperscript{19}Cohen, "What" 1028.
mental activity unavailable to the individual art maker. Those giving instruction in the teaching of art making and art reading can look to AARON for concepts about art making: an explanation of what an artist needs to know about the world and about representation in order to make a plausible representation, from the scribble of small children to more sophisticated levels; an explication of a rule-based approach for art making; and further understanding regarding the nature of image-mediated transactions, that is, the minimum condition for a set of marks to function as an image. Cohen's findings can assist art teachers to help students develop and understand a basis for their mark making acts rather than the copying of objects or other imagery; to utilize a rule-based microcomputer and software package to teach students to delineate the movement from low-level art making skills to more expert levels; and to employ a computer artist such as AARON to illustrate an example of art making that demonstrates basic to sophisticated art making skills and strategies for art students at differing levels in their learning. The AARON model provides an avenue through which art educators can further investigate these basic concerns of art because it provides an illustration of and specific insight into the art making process. A basic emphasis of Cohen's parallels a central concern of the art educator: a desire to understand what

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20Cohen, "What" 1030.
people do when they make images.\textsuperscript{21}

A limitation of the AARON model is the hierarchical, rule-based approach to cognitive formation and learning that it embodies. The dominant ideology of the computer culture is the structured, hierarchical, planner's style used by Cohen and embodied in AARON.\textsuperscript{22} The use of a digitally based computer system for art making limits one to a structured, hierarchical approach. This approach, situated in the analytic methodology of western science, corresponds to the learning style of some, however, it discriminates against other approaches to knowledge, in particular, the "bricolage" approach.\textsuperscript{23} Levi-Strauss, in his study of primitive cultures, used the term "bricolage" to contrast the analytic methodology of Western science with what he called a "science of concrete" in primitive societies. "The bricoleurs he describes do not move abstractly and hierarchically from axiom to theorem to corollary. Bricoleurs construct theories by arranging and rearranging, by negotiating and renegotiating with a set of well-known materials."\textsuperscript{24} The bricolage approach provides what Warren McCulloch called "heterarchical,"

\textsuperscript{21}Cohen, "How" 193.

\textsuperscript{22}See Turkle and Papert 128-157. Not all artists share this approach to art making, although Modern artists who move towards a universal ideal would.

\textsuperscript{23}Turkle and Papert 135.

a computer strategy that allows for negotiation, rather than the primary rule-based planning of the hierarchical scheme.\textsuperscript{25} The AARON model facilitates knowledge through a hierarchical, rule-based, abstract approach, but, it does not address, nor take into account, other approaches to the acquisition of knowledge.

The AARON model provides, however, a notable example of interdisciplinary artistic activity that is necessary for the teaching of art in an age of telecommunications. Beverly Jones argued in a paper given at the 1983 Ohio Art Education Leadership Conference that "the significance of technology in art education is a timely and important issue which must be addressed."\textsuperscript{26} As art educators living in an information society we are challenged to critically examine and responsibly incorporate computer technology at every border where art and education cross. Our children, at very young ages, are socialized into the computer culture through Nintendo, and video games. Research studies indicate that the making of computer graphics can enrich art and aesthetic education.\textsuperscript{27} This requires that classrooms be equipped

\textsuperscript{25}\textsc{Turkle and Papert 144.}

\textsuperscript{26}\textsc{Beverly J. Jones, "Understanding the Significance of Technology in Art Education," a paper presented at the Ohio Art Education Leadership Conference, 1983: 218.}

appropriately, when financially possible, with state-of-the-art computer equipment. More importantly, curricular development needs to incorporate a considered use of computers and call for pertinent computer training for teachers that involves technical skill development and understanding of issues affecting the computer and education. Historically, the inclusion of computer related art in art educational programs has not met with an easy reception. Art educators, knowledgable in questions concerning aesthetic value, are not applying this knowledge to the study and development of new technologies. An additional problem concerning computer learning in art education is the teacher's fear of the technology, which appropriate training could alleviate.


29 Jones 220.

30 Bowers 94.
As a field functioning within the context of the Information Age, art education needs to expand its parameters beyond the primary and secondary levels to incorporate training in computer technology directly related to art making and art reading for the purposes of teacher and university professorial training, as well as research development in art education.\textsuperscript{31} This expansion could occur in art related undergraduate and graduate programs, with a vision towards developing courses in computer imaging, programming concepts, problem solving through programming, and history, criticism, and aesthetic issues in computer related arts and their relationship to the visual arts.\textsuperscript{32} Although there existed an initial resistance to the inclusion of computer related art into graduate and undergraduate curriculum, this situation is slowing altering. Current surveys note a doubling over the last three years of the total number of course offerings in computer related art in colleges and universities in the United States and that approximately 175 to 200 art schools and undergraduate institutions offer degrees, programs, or courses in computer related art.\textsuperscript{33} These innovations in visual arts programs

\textsuperscript{31}See, for example, Freedman and Relan 98-109.

\textsuperscript{32}See the study by Carol Gigliotti and Chitra Shriram of "A Curriculum for The Advanced Computing Center for the Arts and Design" directed towards curricula reform within The Advanced Computing Center for the Arts and Design of The Ohio State University, unpublished essay, 1991.

\textsuperscript{33}See Jannette Dugan's discussion with Charles Csuri in the article "Call this Art?" in Arts Advocate 11 (1990): 4, published by The Ohio State University as the newsletter of the College of the Arts; and Gigliotti and
suggest possibilities for art education programs.

Further, art education developments occurring in primary, secondary, and higher education programs can be incorporated by museums and galleries in educational offerings to the public concerning computer technology and its recent and current impact upon art making. Classes dealing with production, including discussions on issues concerning art made with a computer, could accompany well thought out exhibitions on computer related art. An exhibition of Cohen's imagery, for example, inclusive of both his modernist paintings and his computer generated imagery, could offer an example of a trained artist working on the computer. Employing the contextual approach demonstrated in this study, the student of art education can consider the body of Cohen's work as a unity, moving outside the parameters of the western art historical canon to ponder concerns of art and computer technology, and how these might be incorporated into art critical discourse. Along with other marginalized concerns in art education, the area of art making on the computer is relegated to the periphery, and this is reflected in questions asking how and where it is to be included in the contexts of studio activity, art criticism, aesthetics, and art historical deliberations.

Shriram 1.
If one is to teach well, then one needs to teach towards the future.\textsuperscript{34} This premise suggests that art education needs to encompass our current place in history, embracing contemporary cultural and artistic issues, and working towards a future rather than only replicating that which was done in the past. As art educators we can look beyond the traditional formats of the classroom, museums, galleries, and publications, to innovative and interactive approaches to teaching about art making interlinked with computer technology. This possibility has been hindered for in our age of specialization separate departments, including art education, tend to focus on internal subject matter and goals rather than looking to a more connected interdisciplinary environment that could lead to the generation of new ideas.\textsuperscript{35} With a view towards interdisciplinary and collaborative activity, Cohen's AARON project demonstrates interdisciplinary activity incorporating art making, art history, computer science, and artificial intelligence in the addressing of his inquiry concerning visual communication. Cohen's project provides a model for art education of the incorporation of disciplines arising out of the sciences to assist inquiry based in the visual arts. In particular, computer artist AARON assists artists and art educators in understanding what, and how much, a human being, or a computer program, needs to know in order to draw plants,

\textsuperscript{34} Argued by Gigliotti and Shriram 7.

\textsuperscript{35} Jones 219-220.
trees, and human figures.

Cohen and the History of Art

A final and more general implication of this account of Cohen's work as a continuation of Wittkower's inquiry of how visual symbol yields meaning to the viewer is that a central connecting theme of the body of Cohen's work provides a basis for a more serious evaluation and interpretation of his computer related imagery. This contrasts sharply with the superficial analysis of his computer imagery. My thesis of the Wittkowerian inquiry underlying all of Cohen's work not only unifies his activity but points to the significance of what his art making is about. Through his modern paintings and later computer generated imagery of the program AARON, Cohen is building a theory of visual representation. The body of Cohen's work provides an example of the validity of computer related art. The contemporary interdisciplinary concerns of art history give a place for ongoing deliberation over the entire body of Cohen imagery and the concerns they address and facilitates the incorporation of marginalized areas of art history such as computer related art.36

36See Stuart Hall, "The Emergence of Cultural Studies and the Crisis of the Humanities, October (1991): 11-23; Risatti, in the later three sections of his anthology, focuses upon cognitive and communicative structure in art, and feminist and psychoanalytical criticism in art; Kuspit; and Preziosi.
Further Research

As a result of this study, several projects and many unanswered questions have come forward that can be addressed in further research. The projects and questions vary from the more labor intensive work of building an internationally accessible bibliographic database about Cohen, to further exploration concerning beginning formulations for theory building in computer related art, to the investigation of the male dominated field of computer science that underlies the AARON program and holds implications for the teaching of art making on the computer in art education.

Two projects are of immediate concern. First, this ongoing research on the art making of Harold Cohen has encouraged the building of a bibliographic database that lists exhibitions of Cohen's work, exhibition catalogues, Cohen's writings about his art making, and both academic and popular writings on Cohen. A Redeemer College internal research grant to me has made possible the building of an internationally accessible bibliographic database on Harold Cohen that is located in the Redeemer College Pascal Research Centre. The database will be completed by April 1992. Second, the interpretation of this study linking Wittkower's inquiry and Cohen's art making activity, resulting in a unified viewpoint of the whole of Cohen's work, provides the basis for an exhibition of Cohen's work, with an accompanying catalogue. An exhibition of Cohen's work could incorporate
a selection of his modernist paintings along with his computer generated imagery, arranged chronologically to demonstrate the movement of the work, and be accompanied by the continual generation of AARON plotter drawings along with additional AARON generated wash drawings produced through the use of a robotic arm moving a paint brush. The exhibition catalogue would illustrate Cohen's connection to Wittkower's inquiry.

This study of Cohen has left lingering questions that continued research needs to address. First, the peculiar dilemma noted in historical and critical writings about Cohen draws attention to the large body of critical and historical response to Cohen's modernist paintings and the lack of interest in his computer generated imagery. This quandary points beyond the work of Cohen to the problem of the art historical canon that has come under scrutiny during the last decade. This canon has a place for Cohen's modernist paintings, but it provides no basis for analysis or inclusion of his computer generated imagery. Although a current revision and broadening of the art historical canon is under way, there is still a need to develop a theoretical basis for the analysis of computer related art. Both Roger F. Malina, editor of Leonardo, and art historian David Carrier argue that the area of computer related art suffers from insignificance because of "the lack of adequate theoretical, historical, and critical frameworks," and the lack of commercial or art historical journals to provide any model for the interdisciplinary study of
art, science, and technology. Future research should focus on the
development of a theoretical, historical, and critical framework for computer
related art. This could begin with a study of trained fine artists, renown for
work in more traditional media, who moved to the computer and have
become leaders in art making on the computer. In addition to Cohen, noted
modern artists who moved to the computer such as Charles Csuri and Peter
Struycken of The Netherlands would be included in the study along with
younger artists who are integrating fine arts training and computer
technology. A study investigating the theoretical bases of their work that is
carried over to their computer work may give import to the development of
theories of computer related art, thus building a theoretical framework on
existing theory in art and art history.

Second, a study of the AARON program has lead me to consider the
relationship of gender and computer software and hardware, and its impact
on art making and art education. In a paper I argued that the AARON
program is masculine, and this classification led to a subsequent exploration
of a male way of knowing manifest in the program AARON and in the

37See Malina 67; and Carrier 341.

38See Alice Jardine, "Of Bodies and Technologies," ed. Hal Foster
Discussions in Contemporary Culture (Seattle: Bay Press, 1987) 151-158.
Jardine argues that "technology always has to do with the body and thus with
gender and women in some form." 151.
production of computer hardware, software, and programming. A male way of knowing raises questions regarding how differing views of knowing provide divergent bases to both genders in artistic production, and leads to implications of both male and female ways of knowing in the teaching of those who teach about the making and reading of computer generated imagery. For example, a further understanding of differing approaches to knowing could result in a correlation of particular ways of knowing and specific approaches to art making and art reading.

Last, the question lingers as to what further study is needed in art education to insure adequate incorporation of computer technology at all levels of primary, secondary, and higher education. This question also raises a further issue of the appropriate training needed by those teaching to understand the principles and the issues that are central to art making on the computer.

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APPENDIX A

THE HIERARCHICAL ORGANISATION OF

THE AARON PROGRAM IN 1979
THE HIERARCHICAL ORGANISATION OF
THE AARON PROGRAM IN 1979

Figure 1. Diagram of AARON's hierarchical system of organisation in 1979.
RESPONSE FROM HAROLD COHEN

I was taught programming — poorly — by a music graduate student at the end of 1968. He had me making flow-charts for about six weeks, then gave me a Fortran manual and went off in search of other prey. Flow-charts can be of some help to the beginner in conceptualising simple logical conditions but not much more; I never found them subsequently to be of the slightest use. In the years that followed I would hear from time to time that my ex-teacher was still telling anyone who would listen that he had taught me everything I knew.

I have said many times that Rudolf Wittkower taught me to use my head. That’s much more valuable than learning flow-charts, yet I am quite sure Wittkower would never have claimed to have taught me everything I knew, much less that he layed out for me what my work would address for the next forty years. Of course the job of an historian is to make connections. But assessing the significance and the strength of those connections is at least as important as pointing out that they exist. Wittkower helped me to develop useful intellectual tools; that’s as much as any teacher can do for any student. It is a mark of his value as a teacher that I have spent my life trying to answer some of my own questions, not his.
I recall Wittkower telling this story; he had developed a strong intuition that a certain work of architecture had been influenced by another work. He went to find the original working drawings for both buildings, and discovered that there were corresponding pin-holes in drawings from both sets. That's influence! Perhaps it reflects Wittkower's influence on me that I don't think intuition is enough; that the historian needs to find the pin-holes. Most historical pin-holes aren't quite so tangible, however, and an individual's intellectual development is less measurable than a building is. What constitutes evidence of influence?

Wittkower's interest when I knew him was in proportion, not in measurement. He was convinced that the enlightened audience would "read" the proportions of a facade as a reference to neo-pythagorean philosophical concepts, just as they would "read" the blue of the virgin's cloak. The evidence here is clear in *Architectural Principles in the Age of Humanism*, most particularly from the account of Francesco di Giorgio's recommendations on whatever church it was. In short, proportion for Wittkower figured as an extension to what was fundamentally, though by no means exclusively, an iconographic view of artworks. (One might say here that Wittkower was influenced by Warburg, whose assistant he had been. No doubt he was; but we place the greater value on the opening up of new territory, not on the maintenance of the family farm.)

After forty years it would be absurd to assert that I never heard Wittkower use the word "grid." Some of my own research in his seminars revealed some pretty obvious grids in modern work; specifically, in the paintings of Juan Gris. But while Wittkower was always patient with his students' speculations, he himself never
indulged in the “geometrical analysis” of paintings. And on one occasion pointed out that a Titian which had been “analysed” to reveal the use of the golden section was in fact not the whole painting, a figure on the left of the original having been cut off at some point to provide a new painting. Most paintings are complex enough that the golden section will usually fall on something, and Wittkower would place reliance only on the pin-holes — in this case, documentary evidence that a system had been used. Thus, for example, his rejection of the universal golden section theory of art, pushed by people like Mattila Ghyka, on the grounds that pythagorean proportion is entirely based on the ratios of small whole numbers. There is no evidence that the Renaissance used, or knew about, incommensurable numbers.

My own interest in proportion extended to, but not beyond, the work of the Section d’Or in Paris and (later) Le Corbusier. I rejected it precisely because it became clear that for the twentieth century the use of systems of proportion lacked entirely the philosophical significance it had had for the Pythagoreans; that it was merely a way of imposing an arbitrary compositional order. To the best of my recollection I only ever did two paintings consciously using such systems. One was one of the very first paintings I ever did; the other was the painting — was it called The Sacrifice of Iphigenia? — with which I later won the Slade painting prize.

I lost touch with Wittkower soon after leaving the Slade. Between 1952 and 1956, when I went to Nottingham, I was too fully engaged in making a living, starting a family and pushing my own work forward to see much of anybody. Then I was out of touch with London for the three years in Nottingham — at that time it could take four hours to drive the hundred miles or so — and then for two years in New York.
Wittkower went off to New York, though I don't recall exactly when; I'm sure I never saw him there. I never read his later writing. As his student I never heard him talk about the question of how images are read, either in lectures or in private conversation. And it seems historically unlikely that he could have done so at that time. Gombrich addressed the issue of perception in *Art and Illusion*—with the help of Richard Gregory—but never got much beyond what was then a rather mechanistic view of visual function. The very term "cognition" had not yet come into use. Wittkower was fundamentally an iconographer, which is to say that he was concerned with culturally determined meanings; how they are transmitted and how they lose their significance as cultures change. I never heard him address the question of why particular forms were apparently more available as meaning-carriers than others.

He also had no understanding of anything much after Impressionism. The only time I ever saw him at sea was when he was asked to "crit" a Slade sketch club—an ad-hoc show of student work in progress. And that leads to the question of the influence of the Slade upon my development. The only historian I heard there who dealt with the twentieth century was Anthony Blunt, in a series of lectures on Picasso. The Warburg people had an agenda which ended with Impressionism and was quite selective. There was a conspiracy of silence about Art Nouveau, for example, and I never heard it mentioned; Gauguin was presented simply as a Post-Impressionist. The painting teachers were either inherited from the previous regime who spent their time making innocuous drawings alongside student drawings, or they were Euston Road adherents who pushed the notion of objective observation based upon measurement. I ignored the former and argued incessantly with one or two of the
latter. There was an occasional visitor who represented "official" British modern art — John Piper, Graham Sutherland, Henry Moore — with whom I would have a scheduled half-hour conversation that was never about what was happening in the real world.

Of course I made my own discoveries, as students do, for which the institution deserves little or no credit, and in respect of which the institution offers no guidance. What an institution does offer is frequently hidden in the rhetoric. I became aware years later that nothing I had learned at the Slade suggested that art was made by human beings; art was presented as a series of objects which somehow came about — a sort of immaculate conception. I suppose that explains the distaste of the Warburg people for Art Nouveau; it was too close, too obviously tainted with its human origins. My own more recent writing, as much as my work on AARON, shows a thoroughly negative response to that view.

I also discovered subsequently that I had carried away the notion that a work of art is somehow "better" if it takes a long time and much effort. Nobody ever said it. But the big prize, which I won twice, was given for a painting that was supposed to take the entire summer. Perhaps one might argue that programming a computer to do the work for me represents an ultimate rejection of Slade "influence" in this regard; hardly that it provided a basis for my continuing work.

There is also the question of the influence upon me of the Slade preoccupation with drawing. This is a more technical question, requiring a close examination of what Slade drawing was.
There are three major drawing paradigms in human history. Without suggesting that they are mutually exclusive, one rests upon visual behavior, one rests upon cognitive behavior and the one rests upon intellectual behavior.

European art since the Renaissance has been hung up on the first of these. Perhaps the only culture in human history to be so obsessed with appearances, it has given rise to representational technologies — perspective, photography, video, computer graphics — which reflect a simple-minded and homocentric belief in the over-riding importance of the optical apparatus. The kind of drawing taught at the Slade, coming from the tired Post-Impressionism of the Euston Roaders, represented the tail end of this optical tradition. It was preoccupied, as photography is, with the reflection of light from the surfaces of objects. Objectivity didn't mean simply getting things in the right place, it meant getting all the tones right.

I have always found the view that we store photographs in memory quite implausible. There has to be some stripping down, compaction, of information in the process we call cognition. Central to this compaction is the fact that the eye, front-end to the cognitive system, functions as a contrast amplifier. An edge in the visual field occurs when there is a sudden shift in tone; we are able to amplify the shift, to "see" edges across which the tonal change is imperceptible in a photograph. We are also able to fill in, from our knowledge of the scene, discontinuous — ie, entirely imperceptible — edges.

Thus the second drawing paradigm is manifested in outlines. In cultures other than our own — in our own children also — outlines serve as shorthand for visual
experience. We did not make outline drawings at the Slade. AARON has never made anything else. It is worth noting also, with respect to the fact that color has always played a role secondary to tonality in the European tradition, that my own concern with color did not find expression until the 'sixties, when both Slade notions of drawing and the gesture-based drawing of Abstract Expressionism had been left far behind.

The third paradigm involves the notion of drawing as diagram. All my work in the early 'sixties fell under this heading. There was one person at the Slade who once made a drawing to show me, not how the model's shoulder looked, but how it was put together. He was a left-over academic sculptor who had an administrative job at the Slade. I am happy to acknowledge the source of my own insight into this view of drawing. It isn't surprising that he wasn't officially a teacher.

By and large artists are not too much concerned with the notion of truth. We're all trying to tell a good story; plausibility is everything. I am prepared to believe that the same is true for the historian, but — as in science — establishing historical plausibility requires that the story accounts for all of the evidence, not just part of it. I really wouldn't mind the story which says that in gaining a new audience I lost my original art audience. To the degree that I ignored my audience, why should it not ignore me? But I don't think the evidence supports this particular story and I haven't understood what is gained by telling it this way.

It is a fact that I left England in 1968 and did not make another public appearance there until the Tate show in 1983. I had ended my association with the English
commercial gallery scene in 1967, and by that time I had also given up on my New York gallery connection. It is also true that I have been shunned by the British art establishment since I left; excluded even from major international shows dealing with British painting of the 'sixties. I went underground during the first few years of my computing work and no one in the art world had any notion what I was up to. What would there have been for anyone to write about?

At the same time, the environment for public interest in my work, had anyone in the art world known what it was, was quite unpromising. The art world had recoiled from the *Experiments in Art and Technology* of the late 'sixties, and when I decided to come out of self-imposed isolation I found that the very mention of computers was enough to end a telephone conversation. Nevertheless I was able on the first pass to book shows in Documenta, the Stedelijk Museum in Amsterdam and the Museum of Modern Art in San Francisco. Of course I was aware that it was my previously-acquired reputation that had opened the doors for me, but those doors would have closed quite quickly if I had not been able to generate new interest, particularly since I required a substantial up-front fee from the museums for each show. That hardly suggests a loss of interest in me or my work.

What figures as evidence here? It would not be too difficult to count the number of reviews I have had in the art press and set it against the number I have had from the AI community. I did not start to show in science museums because I could no longer get shows in art museums; *I chose* to broaden my audience in this way. At the same time the record indicates that I was getting all the shows I wanted in art museums, and that they have all generated a substantial number of reviews in the traditional
art columns and journals. Bearing in mind that the art world has become a place of
high fashion and short memory, that most artists get the bulk of their reviews from
commercial shows and that I have been absent from that scene for twenty-five years,
it has always been quite surprising to me that anyone even remembers who I am.

And, finally, there is the difficulty of the work itself. What critic in the art world
knows enough about computers, let alone AI, to take the risk of seeming stupid when
he/she can write about orthodox art without any risk of being found out? How many
people in computing have enough idea about art to assess what I do other than in
technological terms? The most searching writing about AARON has been done in
recent years by worthy and valiant individuals — Pamela McCorduck, Margaret
Boden, George Thompson, for example — who are not full members in either
community.

And to this little band is now added an art historian. She will not mind, I hope, if
I say that I do not believe a really plausible story will have been told until the full
implications of AARON — artistic, sociological, technological — have been worked
out. My reservations do not diminish my gratitude for her work and for her interest
in my own.

Harold Cohen
University of California at San Diego
APPENDIX C

REPLY TO COHEN
REPLY TO COHEN

When my dissertation manuscript neared completion, I asked Harold Cohen if he would be willing to respond to it. He graciously complied with the response found in Appendix B.

I thank Mr. Cohen for clarifying his position and especially for the remarks on how he views Wittkower's influence on himself.

Mr. Cohen and I apparently differ in our interpretations of his work. We whole heartedly agree, however, that AARON's story is not yet complete.

In his response he raises three pertinent questions: the extent of Wittkower's influence, the question of Slade drawing in relation to AARON's drawing, and the nature of the historical gap in the recording of his work. I will briefly respond to each.

Cohen acknowledges his indebtedness to Wittkower for helping him develop useful intellectual tools. Lawrence Alloway discussed Wittkower's influence on Cohen's art making in the catalogue introduction to the Harold Cohen Retrospective 1956-1959 exhibition at the University of Nottingham in
1959.¹ Alloway spoke about Wittkower's influence, how Wittkower's concerns with space, measurement, and proportion became central concerns of Cohen's work until 1956.² Alloway discussed further the grid of the Renaissance floor and how this grid was employed in Cohen paintings, and also spoke of Cohen's obsession with tiny squares that Alloway labeled "symbols of order," and that I re-label "symbols of structure."³ In my dissertation I build on Alloway's contention.

Interestingly enough, Pamela McCorduck in two brief paragraphs in AARON'S CODE makes a similar connection, as I do, between Wittkower and Cohen. She notes Cohen came to see that

an individual gains knowledge through experience, which inevitably varies across a culture, and is even more varied between cultures, but this culture-based knowledge means less for the communicability of visual representations than does the fact that we humans all share the same cognitive architecture inside our heads.

And this insight was one response to an old challenge raised by Rudolf Wittkower, one of Cohen's most influential teachers at the Slade: that art and science together must move beyond description and classification of phenomena and into the investigation of function and meaning, a statement made explicitly in Wittkower's 1955

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¹Alloway, introduction 3-5.

²Alloway, introduction 3.

³Alloway, introduction 3.
Cohen's second question concerns the difference between Slade drawing and AARON drawing. In my manuscript this discussion is very brief and has no conceptual importance to my argument. I removed it.

His final question asks if there really has been a loss of interest in his work. My argument, developed through following the literature of art historians and art critics, is that there has been a loss of interest by art critics and art historians and that this can be observed in a review of the literature. Mr. Cohen notes that by 1967 he had broken connections with both the English and New York galleries, mentions his "going underground" when he first began computing work, and further acknowledges that the most searching work done on AARON has been by individuals not fully part of either the visual arts or artificial intelligence communities. I agree with him that the writings of Pamela McCorduck and Margaret Boden are insightful, although neither claim to work in the areas of art history or art criticism. I maintain that we need a fuller accounting of his work on canvas and computer presented from the vantage point of art criticism and art history, and my dissertation is an attempt to open the discussion.

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McCorduck, AARON'S 68. McCorduck's point has just come to my notice for when I read the entire book fifteen months ago I was not looking specifically for the connection she makes between Wittkower and Cohen.
BIBLIOGRAPHY


---. Personal interview. 17 November 1986.

---. Personal interview. 14 February 1989.

---. Telephone interview. 2 February 1991.


---. "The Meaning of Meaningful Images." Invited paper for a symposium of
the Center for Advanced Visual Studies, Massachusetts Institute
of Technology, 1974.

---. "Three Behaviors for the Partitioning of Space: Harold Cohen." Art
International 16 (1972): 24-25.

---. "What Is An Image?" Proceedings of the Sixth International Joint
Conference on Artificial Intelligence (1979): 1028-1057.

Cohen, Harold and Becky. Harold Cohen. Amsterdam: Stedelijk Museum,
1977.

Compton, Michael G. "Harold Cohen." Harold Cohen. London: The Tate

Cork, Richard. "What Will Aaron Draw When He Grows Up?" The Standard

Cussins, Adrian. "The Connectionist Construction of Concepts." The
Philosophy of Artificial Intelligence. Ed. Margaret Boden.

26-29, 61-62.

Dreyfus, Hubert L. and Stuart E. Dreyfus. "Making a Mind Versus Modeling


Dunlap, Sue. The Computer as an Artistic Tool. Greenwich, Connecticut:

1983: 33.


Heron, Patrick. "Americans at the Tate Gallery; Abstract Expressionists the Most Provocative." Arts 30 (1956): 15-17.


