

N°13

COLLABORATIONS WITH MY OTHER SELF

HAROLD COHEN



GALLERY@CALIT2
EXHIBITION CATALOG N°13

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OCTOBER 27 -
DECEMBER 9, 2011

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Published by the gallery@calit2

University of California, San Diego
9500 Gilman Drive
La Jolla, CA, 92093-0436

ISBN 978-0-578-09704-6

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ABOVE: "FROM HERE TO THERE", 2011, 48" X 120"

ESSAY

RECENT PAINTINGS OF HAROLD COHEN: THE MIND'S JOURNEY TO ITSELF

BY LOUISE SUNDARARAJAN, PH.D., ED.D.*

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Why is Harold Cohen picking up the paint brush again after leaving the coloring job to AARON, his program, since the mid-eighties? There is a short answer and a long answer to this question. The short answer goes something like this (based on personal communication with the artist on Oct. 2, 2011):

Program autonomy had been Cohen's goal for AARON from the very beginning. But in 2009 a newly developed and very general form generator brought it very close to that goal – it could now handle color, forms, composition – and Cohen suffered something of a crisis. The program didn't need him anymore! In the aftermath of that crisis, Cohen had little to show beyond half a dozen small panels, printed in color except for the backgrounds, which had been left gray. That gray became increasingly intolerable to Cohen, and he pulled out paints and brushes simply to correct the source of his discomfort. He found in doing so that he had effected a startling transformation to the nature of the image, requiring a complete rethinking of how his images came into being.

This rethinking about images entails the story about a mind's journey, which can be summed up succinctly by the following lines of the German poet Holderlin:

*As you began,
So you will remain.*

Spelling out in details how the artist's intellectual journey has come full circle – how innovation in Cohen's recent paintings harkens back to his early insights into the na-

ture of images – constitutes the long answer to our question.

Image as “standing-for-ness”

“For Cohen a painting has never been just a collection of marks or a decorative, exciting or beautiful object but had to be involved with ‘conjuring meaning’. His career, both before and after his adoption of computers, has been driven by a belief that whilst images must have their own structure or internal logic, their ‘primitive magic’ is that they are able to stand for things that are *not literally present*, even if these things are not directly recognizable as part of the wider visible world” (Cornish, 2011, p. 4, emphasis added).

In philosophical terms, this primitive magic of the image that Cohen talks about rests squarely upon a basic principle about symbolic representations. In the words of the philosopher Terrence Deacon (2010), information is “dependent on a relationship to something *not present*” (p. 167, emphasis added). He goes on to say:

“... the imagined significance of a coincidental event, the meaning of a reading from a scientific instrument, the portent of the pattern of tea leaves, and so on, really is something that is *not there*.” (p. 167, emphasis added)

To fully understand this assertion of Deacon's, we need to consult a great thinker in philosophy, Charles Sanders

Peirce. According to Peirce, symbolic representations entail a relationship among three terms: (a) the sign that represents something; (b) the object of representation; and (c) the *interpretant* -- the mind that interprets or makes inferences by determining the relation between (a) and (b). Note that while (a) is something present, (b) is an absence which, thanks to the *interpretant*, is inferred to be what (a) is about.

Implicitly capitalizing on absence, Cohen claims that the goal for art is “standing-for-ness,” which consists of “an evocation of perhaps unnamable aspect of the world, rather than a direct representation of a specific part of it” (cited in Cornish, 2011, p. 5). Cast into the Peircean framework, an artistic representation, according to Cohen, corresponds to the sign (a), which does not stand in a one to one correspondence kind of relationship to the object of its representation (b), because (b) is an absence—something unnamable, which cannot be directly represented, but can only be evoked, thanks to the inference-making capacity of the *interpretant* (c). This has far-reaching implications for our understanding of computational creativity: To the extent that absence is central to the notion of image as stand-for-ness, and to the extent that absence can only be inferred, not computed, creativity is a function of the *interpretant* rather than that of computation.

The above formulation of image as stand-for-ness highlights two essential ingredients in symbolic representation: first, mind functioning as the *interpretant*; and second, absence, which warrants further explana-

tion. Absence is the major element that determines the extent to which an image is a symbolic representation. For instance, portrait painting is relatively less symbolic than abstract painting, because of the former’s potential to become an icon, in which there is a one-to-one correspondence between presences (the image = the person). The importance of absence in symbolic representations can best be illustrated by Chinese art, especially in its treatment of the void.

From empty space to the void

The void in Chinese painting is not the same as the empty parts in Western painting. The void is a symbolic representation of absence or non-being, whereas in Western (post-Renaissance) painting, there is no void; the blue paint in the background— or, rarely, the unpainted canvas – represents sky, which is as physical as the rocks in the foreground. Thus in Western painting, space – whether painted or left blank – is a continuous presence, something objective and physically measurable.

By contrast, the void in Chinese painting is predicated upon a discontinuous presence – presence perforated by absence. This perception entails a different approach to space and presence, an approach with a particular sensitivity to absence and non-being. Thus George Rowley (1974), a scholar on Chinese art, points out: “Such a conception [as the void] has had no parallel in the west, because our concern with actuality has made us emphasize the existent rather than the non-existent so that the sky was a space-filled realm and not a vehicle for imparting



"The void in Chinese painting is not the same as the empty parts in Western painting. The void is a symbolic representation of absence or non-being, whereas... in Western painting, space – whether painted or left blank – is a continuous presence, something objective and physically measurable." - Louise Sundararajan



a sense of the infinite" (p. 71).

As I mentioned before, absence goes hand in hand with the *interpretant*. This point is underscored by Rowley (1974), when he claims that, "The crucial question is what these empty parts signify?" (p. 71). The *interpretant* is a term used by Charles Peirce (Hoopes, 1991) in reference to the capacity of the mind to make inferences, and to interpret signs. In keeping with the foregoing discussion on the important role absence plays in inference making, a more concise formulation of the *interpretant* would be this: The *interpretant* is the mind applying itself to absence. This line of thinking is commonplace in Chinese aesthetics. To wit, a late 17th-century Chinese critic complained about his contemporaries: "Modern painters apply their mind only to brush and ink, whereas *the ancients applied their minds to the absence of brush and ink*" (cited in Rowley, 1974, p. 71, emphasis added).

In sum, it is when the mind applies itself to absence that empty space becomes the void in Chinese paintings. One important consequence of the mind applying itself to absence is that the void has become, in the words of Heidegger (1971), "a presence sheltered in absence" (p. 199). Rowley (1974) says the same thing when he claims that the void is the symbol of "that non-existent in which existent is" (p. 72). Thus by dint of the inference-making capacity of the *interpretant*, the void in Chi

nese painting is a virtual presence with such a palpable impact that it rivals, and more often than not outweighs, the actual presence of things. For illustration, consider Rowley's observation (1974) in Chinese paintings of "a dynamic equilibrium of solids and voids" (p. 72), which refers to "the extent of void needed to hold a given solid in equilibrium . . . so that a small solid, a tree group, a single tongue of land, or a middle distance cliff will suggest such a transition from the finite to infinite that a vast extent of void will be needed to satisfy the solid" (p. 72).

This digression on the Chinese approach to absence gives us a useful angle, when we turn to Cohen's recent paintings, in which there is a fundamental difference from past conventions in Western painting in the handling of backgrounds and the forms. In light of the foregoing analysis, to understand the new figure-ground relationship in Cohen's paintings, we do well to start with AARON's role as the gap maker, one who renders absence visible by creating differences and discontinuities.

Evolution of AARON as a gap maker

Gaps are differences or discontinuities, anything that disrupts the continuity of presence. As such, gaps make absence visible and thereby prompting the *interpretant* to make inferences. Without gaps, the mind would be moving along sluggishly in a sea of homogeneity. The gap between the self and the nonself renders visible to the self an absence of knowledge about the other. Between humans and the machine,

there is a bigger gap – a discontinuity in being.

Cohen has capitalized on the gap-making capacities of AARON since the very beginning: Unlike God who created humans in His own image, Cohen created AARON to be different – a wholly other, so to speak. He said in his interview with *Scientific American Frontiers* in the mid-90s: “I’d be happier if AARON’s work in the future were less like human work, not more like human work” (cited in Cornish, 2011, p. 7). As a programmer, Cohen’s goal had always been program autonomy (Cohen, 2009). He recounts as milestones the progressively widening gap between the human and the machine: the realization in the mid-1980s that human and machine are polar opposites in their coloring abilities; the realization in 2009 that the newly developed algorithms were “very un-human” in that there is no discernible knowledge base, nor intelligence in the sense of decision making – all rules are local; no grand plans. With the development of the new algorithms, AARON’s autonomy has become “absolute” – the gap between the programmer and the program is now a chasm capable of creating a relationship crisis for Cohen. The gap created by AARON at the epistemological level is no less cataclysmic.

In conventional painting there is no gap between meaning and intention, both of which are attributable to the painter. Not so when AARON gets into the act.

The painting machine produces prints that can have meaning, but poses difficulty in the attribution of intention. This gap between meaning and intention is negligible, so long as our attention is distracted by AARON’s complex imagery with its space filling forms. With the new algorithms in 2009 that resulted in simplified imagery, the gap between meaning and intention started to stare at you in your face. Cohen (2010) recounted that:

“Interestingly enough, as long as AARON’s images were pretty complex there didn’t seem to be much of a problem with the untouched-by-hand look of its prints, just as there doesn’t seem to be a problem with photographs; the intentionality gets transferred to what the image represents. But in the final months of last year [2009] I had been making a conscious effort to simplify the imagery, with the result that the individual elements were getting larger and, consequently flatter” (p. 14).

From gaps to the void

When Cohen picked up the paint brush again, a profound change took place on multiple levels: the blank space changed from an ideationally neutral background to an absence, which caused some “discomfort” that was attributed to perceived defects in AARON’s print, or to an intolerably monotonous gray background. Whatever it was, something was missing. When the mind applied itself to the perceived



ABOVE: "SETTLING DOWN", 2010, 28" X 34"

absence, another transformation took place: The mind did not fill the gaps, but instead conjured up a presence that flourished in the gaps. A classic example of such “a presence sheltered in absence” (Heidegger, 1971, p.199) is intentionality. As Cohen points out, the gap created by AARON between meaning and intention has much to do with the fact that its images are untouched by hand. He explains that intentionality is usually associated with the manipulation of physical materials in conventional image making. Thus,

“...part of the problem with electronic imagery is precisely its untouched-by-hand look; if it wasn’t touched by hand, if it shows no evidence of the manipulation of the material, then it becomes that much harder to believe in its intentionality” (Cohen, 2010, p. 14).

Adding a level of materiality to the electronic imagery by AARON seemed to be the right thing to do:

“Whether I knew it or not—and I didn’t—that seems to have been the reason for painting over the background of one of AARON’s little panels. I was opening the door to the assumption of intentionality in the reading of the image” (Cohen, 2010, p.15).

Once the inference-making process has one foot in the door, the interpretant has to go all the way:

“I thought all I’d have to do was to

add a level of materiality, but that has turned out not to be the case. Some of what I do is aimed at clarifying what AARON “intended.” Most of it is done at the “micro-level” of structure, where a subtle shift in emphasis can make a significant difference to the reading of the image. (e.g., AARON separates overlapping forms with a Mach-band shadow – that is, the enhanced brightness contrast which the visual system uses for edge-detection – over the behind-form. I deliberately exclude Mach-band-ism, which means some, usually slight, overall modification of the colors)” (personal communication, 7/10/2011).

To recapitulate, when the mind applies itself to absence, it transforms the latter into a special type of presence — a presence sheltered in absence, best exemplified by the void in Chinese paintings. Indeed, corresponding roughly to the voids and solids in Chinese paintings, there are two types of presence in Cohen’s recent paintings: virtual presence (AARON’s intentionality), and actual presence (AARON’s images). The following remarks of Cohen remind me of the dynamic equilibrium between voids and solids in the Chinese paintings; note especially the preponderance of the former (intentionality) over the latter (forms):

“I sometimes feel as though AARON is presenting me with a world behind a gauzy screen, and that my job is to remove the screen and show what’s really

there. . . The only times I 'edit' is when AARON makes images in which some passages are difficult to read and I need to clarify them so that I know how to proceed . . . I don't add my own forms. Nothing purist here, AARON's handwriting is too difficult to emulate" (cited in Cornish, 2011, p. 9).

The mind's journey to itself

In conclusion, the recent paintings of Cohen tell the story of a mind's journey that has now run full circle, with the culmination of two developments in the long career of Cohen as an artist: AARON as a gap maker reaching its fullest potential in rendering absence visible, and mind as the *interpretant* operating at the height of its referential competence (Deacon, 1997), capable of transforming gaps into void. While the void in Chinese paintings is associated with the infinity or the "mystery of emptiness" (Rowley, 1974, p. 72), the void in Cohen's paintings may best be understood as a mirror. In painting the background without filling the void, the mind is painting itself -- as if in peering into the void that the mind sees its own reflections as the interpretant. The most delicate colors of the background in Cohen's paintings evoke a special kind of being, a being in-between presence and absence, or rather something akin to the womb from which presence and absences, representations and inferences, have their being. This womb of consciousness is understood to be, in the Buddhist tradition, the mind.

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INTERVIEW WITH THE ARTIST: HAROLD COHEN

BY SHELDON BROWN*

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Who better to interview artist Harold Cohen than Sheldon Brown? Their artistic careers have veered in different directions, but between them, they account for an unbroken lineage of leadership at the Center for Research in Computing and the Arts (CRCA), an interdisciplinary research unit at the University of California, San Diego. Building on what had been the Center for Music Experiment at UCSD, Cohen became CRCA's founding director in 1992, even as he became an Emeritus Professor in 1994. When he decided to retire from academic life in 1998 – while remaining an active and prolific artist – Cohen passed the reins of CRCA to Sheldon Brown, who remained in the job until 2011. Brown and Cohen shared a passion for the role that computer programming could play in visual art. So when they sat down to talk for this interview, it was natural that the Q&A should start with a question about the genesis of Cohen's love affair with computing.

Sheldon Brown [SB]: Harold, I guess one of the first things that would be good to talk about is how you actually came to work with computers. You had a pretty good career going as an artist in Britain in the '60s. You achieved some good recognition and renown for your work, but then somehow you came to California and started working with computing.

Harold Cohen [HC]: Well, I came to California intending to be here for one year. I came on a visiting professorship.

One of the first people I met was a graduate student in the music program who volunteered to teach me programming. I was feeling fussy enough about my own work at that point that I was looking around and thinking there must be more interesting things happening than were going on in my studio. So when this kid said he'd teach me programming I said, yes, let's do that. In the first place it was simply excitement about a completely different intellectual discipline. I felt as if I was using my brain in a way I'd never been using it before, which was exciting and invigorating. Then, eventually, I think it took me about six months, I realized that this might actually help me deal with issues I'd had before I came here. The background was that in the '60s I'd been working increasingly toward the idea that one could make art by writing a set of rules and then simply playing out the rules. When I represented the UK in the Venice Biennale in '66, all of the paintings had been done following that paradigm. So, once I got over my initial excitement with programming, I started to see that this was not only a medium in which one could express rules rather precisely, it was also a medium that could potentially execute the rules once the rules had been stated. So that was really the beginning for me.

It has to be remembered, though, that computing then wasn't the same as computing now: Moore's Law says that computer power per dollar spent dou-





bles every 18 months. I got involved at the end of '68, so my program and I have gone through something like 28 doublings in that time. Two to the 28th power is a bit more than 276 million. So if you want to get a sense of what computing was like then, compared to what it is today, think of it as one-twelfth of a postage stamp on a football field. That's how much power we actually had. It's remarkable that we thought we could do anything with that.

SB: I guess it is remarkable at the time that you took on that investigation. I'm thinking about other early investigations into computing as an art and tool for culture at that time, and didn't know if that was a part of the things that you were looking at -- what came out of Bell Labs, or the University of Utah's early work in computer graphics.

HC: No, in fact I knew almost nothing about what was going on outside my own studio. I realized only quite recently that there was a fundamental difference between what happened in Europe and what happened in America. What happened in Europe, in Germany, principally, was that a number of physicists moved into the scene, homed in on the style that must have seemed most appropriate, and certainly the most doable: Constructivism. Just about everything that was done in Europe was fundamentally Constructivist. No such thing happened here, because none of the early people moved in from science. They were all people – Chuck Csuri, for example – who came to computing from a background in art, bringing their own much more individualized concerns with them. In fact, my own work was quite different from what else was being done. I was really interested in finding out what a program could do, not what I could do with a program. So from the very outset, my work was heading me towards artificial intelligence – although I didn't know such a thing existed at the time. As you know, I subsequently spent two years as a guest scholar in the AI lab at Stanford.



SB: Right, and so that progress of recognizing that the ideas that you had been germinating as an artist in computing had some relevance or connection to this other intellectual discourse that was taking place.

HC: As it turned out, it did, but I wasn't part of that discourse.

SB: So, over the years, as you say, you were a fellow at the Artificial Intelligence (AI) lab, you've spoken at a lot of different AI conferences over time. That community is, I think, has looked at your work quite a bit. So how would you characterize a little more the kind of influence or give-and-take with the AI world?

HC: Well, it could be that my work is respected in that community largely because they don't actually know how it works. Nobody reads other people's code, and if you don't know what the code says, then whatever it does seems a bit like magic. But then, there were a number of magic-like things going on at the time I spent at Stanford – one grad student was retrieving Caruso's voice from old recordings, someone was persuading the vending machine to do its own billing instead of accepting coins – and the movers and shakers I got to know were very generous and open-minded. I was invited up there by Ed Feigenbaum, the man who actually invented the term 'artificial intelligence,' and who specialized in putting people on the right path. He recruited

Bruce Buchanan, later president of the American Association for Artificial Intelligence, for example, when he was a new Ph.D. in philosophy. He saved my son Paul from what he saw as a fate worse than death – the doctoral program at UCLA – by inviting him to co-author the Artificial Intelligence Handbook and to do his Ph.D. at Stanford.

At that time, Expert Systems was in the ascendent, and if I was influenced by the community, it would have to be that from the outset I sort of took it for granted that you could not only give a machine the knowledge that a human expert has, but that you could also model the expertise itself.

Well, that was a problem for me, because I don't know anything about human expertise in art. I can do it, but I couldn't tell you anything much about how I do it. That's particularly true about expertise in color. I don't know any colorist who could tell you how he goes about picking colors. I was reckoned to be a pretty good colorist in my pre-computing days, and my way of doing it, characteristically, was that I would sit and stare at the canvas for anything up to an hour, then I'd walk up to my paint table and mix two colors together, which seemed somehow to produce what was needed. How I arrived at it I never had the first idea. Of course I couldn't have dealt with color at the beginning because there weren't any color devices; no monitors, no output devices. But when, finally, some 10

or 15 years after I became involved in computing, I saw that I needed to take on the problem of color, the AI paradigm for programming was something of a roadblock for me. How do you model your own behavior when you don't know anything about that behavior? I didn't know how to proceed; I was up against a brick wall. But finally I realized something that seems very obvious to me now – that machines and human beings are really very different entities. A program has capabilities that don't correspond at all to a human being's capabilities. Then I started to make progress, and in doing so, found myself in a kind of break with the conventional AI paradigm.

SB: Maybe over time, a lot of the different paths AI was trying to mine sound like they've come to some similar conclusions about how voice-recognition systems work, and other things where they say in order to make progress, we actually have to abandon trying to think about it as a human.

HC: You have to abandon it. Natural language handling, for example, is now done almost exclusively statistically. The idea that the program has to understand the words in the same sense that a human being understands the words wasn't productive. Nobody could make it work. And it was the same for me in '85-'86. Human beings rely absolutely on a refined visual feedback system in order to handle color and, almost inevitably, human colorists work by what

you would call a 'hill-climbing' strategy in AI terms. You put a color down, then you put another one next to it and then you adjust the first one and then put a third one down and adjust all of them. And you keep on with this continuous adjustment until you have a sense that you've got it right. You could never say what was right about it, or even what you thought right meant. And here's a computer that doesn't have any visual system at all, but has something that a human being doesn't have, which is an absolutely impeccable memory and an impeccable ability to build an internal model. Human beings actually have almost no color imagination; by which I mean the ability to build a stable internal model of a color organization. I can't say to my assistant, 'I want you to mix two parts of this and one part and a touch of something else and of that and put it over there.' You can't build a color image in your head. The computer, on the other hand, can do that perfectly well. So once I'd realized that the thing had to be formulated in the program's terms, not in my terms, then I was able to make significant progress. The problem fell apart fairly easily, actually.

SB: Well, it's interesting too: I know in the development of AARON, which has now been in development for...

HC: Forty-two years.

SB: Forty-two years. The software that you work with is kind of this monolithic



ABOVE: "TAKING PLACE", 2011, 35.6" X 44.125"



program that's been growing and changing. I'm not sure if it's still the case but I know for much of that development you used the computer language Lisp to program AARON, which is the language of choice of the artificial intelligence community. Did you find in Lisp a way in which the asking of questions with the computer was more facile?

HC: Yes, in fact I started using Lisp when I found myself faced with the coloring problem. I'd been programming in C, and the change from C to Lisp was certainly a very important part of the move away from the conventions. C is a bit like marching. Lisp is a bit like dancing. It's so much more expressive. I can't think of any way that you could express concepts about color in C. You can give measurements, but if you want to deal with color yourself or with a program, you don't do it arithmetically. You're talking about qualities; you know, some part of the surface being a little more transparent than another, one color appearing to lay over another color, even though, in fact, there's 1/1000th of an inch difference between them. I never discovered any way of expressing quality in C. Lisp was another matter. I didn't find it easy, but I did find it tractable.

SB: In the work, one of the things that I find really fascinating in thinking about it over time is I think there's a kind of overt apparency of the particular issues that you're wrestling with at a time that

come across in the pieces. For instance, if I think back on some of the earlier work, one thing that was always striking to me is it seems that the states of your activity are very much about what are the fundamentals of drawing. What actually makes an image? How do you go from something being called 'a line' to something being called 'a shape'. This discourse that you seem to be having with the program, with your concepts, with how these are represented on the computer become very apparent as the final outcome of the work. I think in the works that we're featuring in the show at Calit2, these ideas that you're talking about around color are very present. Do you feel that the outcome process that you're making is not necessarily a kind of conclusion, but really just another kind of question that you're asking with the system.

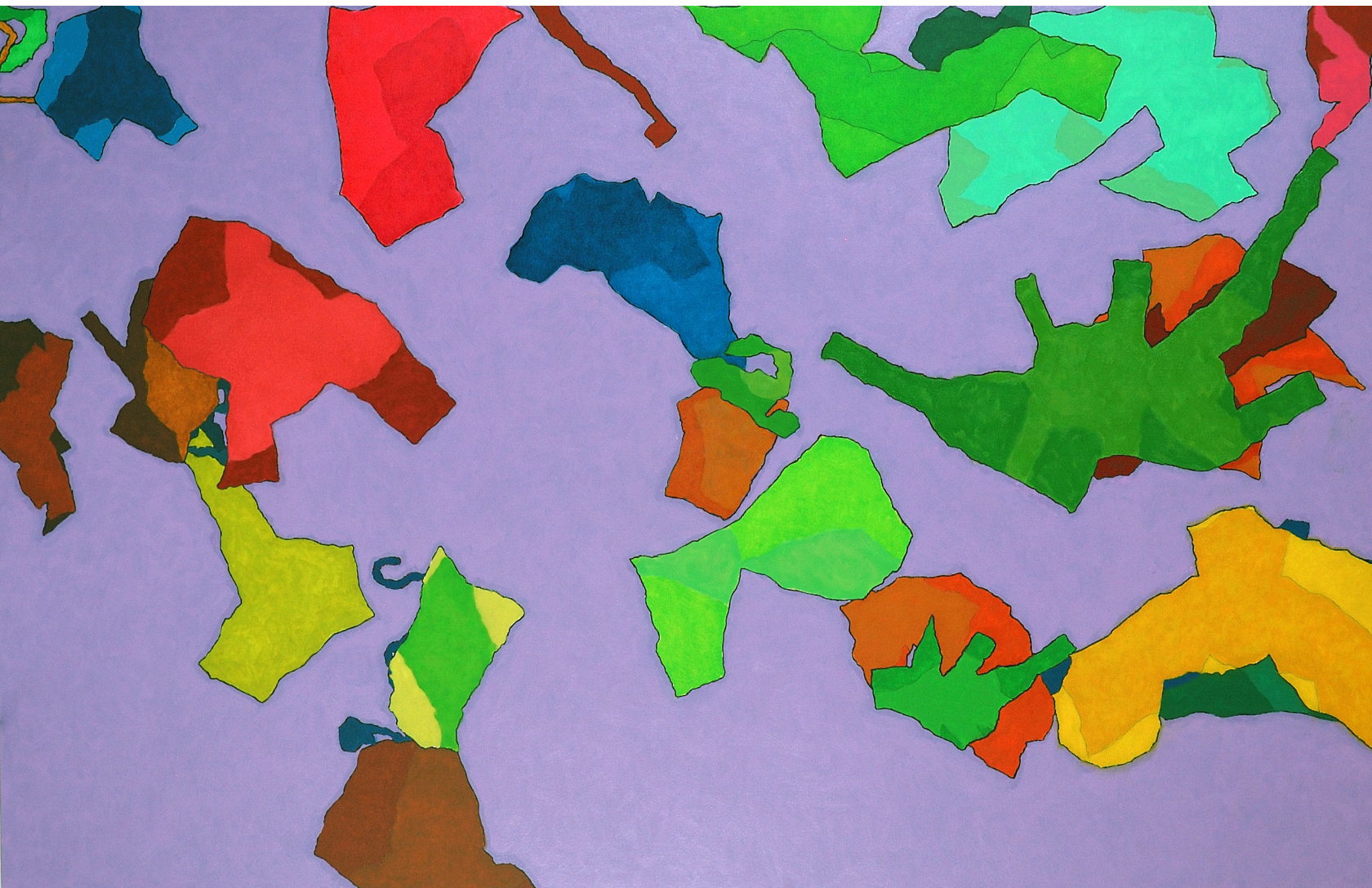
HC: Yes, I think that's very much the case. I'm not sure that that's an advantage in today's art world, actually, where really you're expected to settle on a style and display that style forever. Somebody recently writing about my work said that 'Nothing is cast in concrete.' I forget the exact wording she used but I realized, yeah, that's one of the reasons I don't quite fit in the contemporary art world. I don't know what tomorrow will bring. I don't know what kind of questions will come up tomorrow. But I think you're right -- I think those concerns do come through in the individual works finally.

SB: Another interesting thing as I look across the body of work is that despite maybe what you just said about not having a consistency, to me there's a very strong consistency across all the work, except in one area which is the actual manifestation of the work. There seems to be an ongoing exploration of how this work should actually exist in the world. Early on, you did a lot of work where you built painting machines: robots that would execute the paintings. And some of these you did as quite performative installations. You've done prints, you've projected onto canvas and painted. You printed black and white and painted on top. It's a range of gestures that you make to get this stuff into the world. Some of it exists on a screen itself. Talk a little bit about those moves and those strategies and what you like and dislike about different approaches.

HC: I think most of those things have been simply attempted answers to quite pragmatic considerations. When I started, the first display that I actually had under my control was a little Tektronix screen, probably about 8 inches by 10, on which a little green dot would dance around all over the place leaving a line behind it, like a light green line on a dark green background. And I thought, this is great, I like looking at it, but I can't show it to more than one person at a time. What am I going to do with this? I never lost sight of what I thought was a necessary role for an artist, which was to put the work out there

in public for people to see. In the final analysis you work for an audience of one – yourself. Even so, there's a strong need to have other people see it, and I was faced with the problem of how to exhibit work I could only see on this tiny monitor. I thought, well, it's making drawings, so maybe I could make a drawing machine. I was so ignorant of engineering, you wouldn't believe it. I mean, I didn't even know that you could buy the parts you needed from a catalogue. So I was in the machine shop sort of punching holes in metal tape when I could have bought a plastic drive cable with no trouble. But with my sub-postage-stamp computing capabilities, I did, in fact, in fact, build my first drawing machine and did two or three museum shows with it.

Then I thought, well, drawing machines are fine but while the drawings are quite small, the machines themselves are actually a pain to cart around and install. I remember on one occasion I was doing a show at the L.A. County Museum of Art. We went out for lunch and came back and the drawing table was in the middle of the room with people 10 deep around it, waiting for something to happen. Nobody could see it. So I thought, what I can do, I can build a little thing that rolls around on the floor and makes big drawings. So I built my turtle, and the turtle did shows at dOCUMENTA in Germany and the Stedelijk Museum in Amsterdam, and the San Francisco Museum of Modern Art. The San Francisco show was a



ABOVE: "IN THREES", 2011, 48.75" X 79.25"

nightmare at the start. That was in the old building in a big gallery on the top floor, and it was right underneath the huge electric motors that drove the elevators. I was using a sonar system: We'd have two microphones and the turtle would make ultrasonic noises and the two microphones would pick them up and the program would triangulate where the turtle was. And then somebody would get in the elevator and all hell would break loose. So while I was there I had to revise the software so it could tell the difference between real data and noise. But there were still problems. It was drawing on these giant sheets of paper, like 30 feet by 10 feet. It was photographic back-drop paper, the only kind of paper made that big, which is so vulnerable to damage, it would fall apart when you looked at it. So I was left with all these drawings that couldn't possibly be used by anybody. But by this time I knew a little bit more about engineering and I built a series of rather larger, quite respectable drawing machines and did several shows with them. A couple of them are in the collection of the Museum for Computing History.

But then I got involved in color – and hey, I thought, let's be logical about this! If you have the drawing machine for showing drawings, you have to have a painting machine for showing paintings. That was an episode in my life I could have lived without, actually. I mean, the machine worked OK. But I did only one show with it, at the

Computer Museum in Boston, and then it was featured on *Scientific American Frontiers*. But it needed somebody to look after it all the time. When I wasn't there I had to have one of my assistants with it. I didn't want kids coming up and putting their fingers on the thing's rails and having their fingers chopped off. Still, the reason for abandoning it was that it was becoming increasingly obvious that the audience was much more interested in it as a robot than they were in what it was painting.

SB: There is something attractive about that kind of agency that we seem to give the robot.

HC: Oh sure. They would walk in and watch while it was painting, and it would pick up the cup and empty it and wash it out and wash out the brush and pick up a new brush and mix color. "Hey, it's washing its own cup. It's doing housework. It must be a robot!" No, I'd say, "it's no more a robot than your desktop printer is a robot." But it didn't persuade anybody.

SB: Then again, that machine kind of embodied processes of your notion about making art. So that machine is built very differently than, say, the giant printers than you've been working with since, which weren't built by artists, but built by engineers who were making something efficient. But the work that you've developed that would utilize those machines seems to have allowed the underlying artwork to progress in a



RIGHT: "BORREGO #13",
2007, 69.5" X 46.5"

way without the focus so much on the engineering and the machines.

HC: Quite. In fact, the wide-format color printers we're using now, in my view, represent the first real revolution in color technology since the Industrial Revolution. Those things can produce colors that you can't produce any other way. But you're right – for me the point is they allow me a much more direct path from what the computer is doing to what you see in the output. It didn't have to go through all this stuff. To be realistic, I've spent very large chunks of time during this exhibiting career being in galleries talking to people. I thought from the outset that if I'm presenting people with something they knew nothing at all about, I had some responsibility to be there to help them understand what was going on. By the time I got through with the painting machine, though, I thought, 'There isn't enough time left in the world to spend talking to people about how machines work.' So the painting machine went to join its forbears in the Computing History Museum, where it's now a permanent exhibit, and I bought a wide-format printer.

SB: And so now in this show, we're having pieces that have a few different kinds of output modes. We have the prints, we have some that are painted: it's a mixture of the different ways that you've worked.

HC: Well, there are three groups of piec-

es in the show that reflect what actually happened. In the first place I was simply making prints. By the way, for people who don't know what these printers are, I should say that they're not at all like desktop printers only much bigger. Desktop printers are typical consumer devices; if you needed any knowledge or skill to use them, they couldn't sell them. These wide-format printers are refined, very professional devices, and you do need knowledge and skill to get the best out of them. It took me about a year to learn how to use mine.

So then, I was making prints, but you know, part of me is a muralist at heart. My printer could only print about fifty inches wide, and I felt constrained by the scale. There are a couple of large ones in the show, though they're not large by painting standards. You'll see what the problem is when we hang the show. They're about four feet by six, and by the time you've put a frame around them with a sheet of plexiglass in front of them, they weigh like 150 pounds! And I started to think, this is stupid. Why do I have to put plexiglass over them when I could spray them with a protective coating and eliminate all of that heavy protective stuff. That accounted for the next stage. There are pieces in the show which have been printed, mounted permanently onto flat supports, and then sprayed with an acrylic medium over the top to make them resistant to finger marks and scratching and all that kind of stuff.



ABOVE: "STARTING OVER", 2011, 50" X 80"





Then finally, the last group of works in the show really comes out of what is perhaps the biggest single breakthrough in my career after meeting my first computer. And it happened as much by chance as anything else. Somebody had put my name forward for a limited competition for some public art commissions in San Diego, and I spent about six months working on the project. It was going to be a 15-foot-high hanging sculpture. And then I didn't get one of the commissions. So there I was, after six months away from my regular work, with nothing to show for it in terms of my own output. All I had were these little panels, which I'd prepared as pairs to show the people doing the commission what the piece would look like from front and back. Since the piece had a big window behind it, one view was done with a white background, while its opposite view was done with a gray background.

I was stuck. I'd really lost track of what I was doing, and what I thought I should be doing, and I didn't know how my work should be moving forward. All I had were these little panels. I was sitting in the studio feeling frustrated as hell and getting increasingly irritated by these these neutral backgrounds, and I thought, "I'm going to get rid of those stupid backgrounds." I dug out my paints, which had been in storage for 10 years, and I started painting over the background of one of the panels. The change was astonishing. The whole image changed its identity. You could

no longer see whether some was painted and some was printed. It became a completely different kind of object. I thought, "Hey, that's interesting. What did I do?" I didn't know what I did. So I did another panel, and the same thing happened.

At that point I had a bunch of work, done before the commission, that was intended to go off for a show in London, and I started painting over them – just the backgrounds at first, but then I started painting over the entire image. Eventually I realized I was off again on a rather different path to what I'd expected. I started doing more work on the program so that rather than producing the finished image, it would produce a sort of underpainting that was created explicitly for me to carry on with. So, that's almost the complete story. In the last step, the program doesn't do an underpainting, it prints a drawing, the outline of the image, and then separately produces a color sketch to guide me. The last three works in the show were done that way. The shift has a lot to do with the fact that oil painting is at its best when you get light reflected from the white ground underneath. I wanted a kind of clarity that I didn't think I was getting from painting over the underpainting. And that's where we are today. What we'll be doing tomorrow I'm not sure I know.

SB: It's interesting, this ongoing relationship between the concepts and the way of thinking that is in conversa-

tion between your notions and the way they can be translated with computing. But there's still materiality that is the mediator of that discourse.

HC: One of the things that is becoming increasingly important for me is the whole issue of the part that making plays in the making of a work of art. When this public art commission came up I was in some concern about the state of my work anyway. If I hadn't been, maybe I never would have taken on the commission in the first place. My work for a long time had been very complex formally, with very detailed elaborate things going on all over the surface, and I wanted to simplify it. But I was finding that as the things got simpler with larger color areas, they also seemed to get flatter in a way that I didn't quite understand. Now I think I understand; it's not that there was anything wrong with having large, flat areas of color, but that nobody seemed to have made them. The complicated ones seemed to have a sense of intentionality that was related to the subject matter itself, in the same way that in a photograph (which is untouched by hand) the artist's intentionality is really transferred to the subject matter. You don't worry about whether it's been touched by hand. You can see what he intended you to think about. But as soon as my images became very large and flat and open, that sense of intentionality seemed to dissipate somewhere. Now I think it has to do with the whole issue of making. Throughout

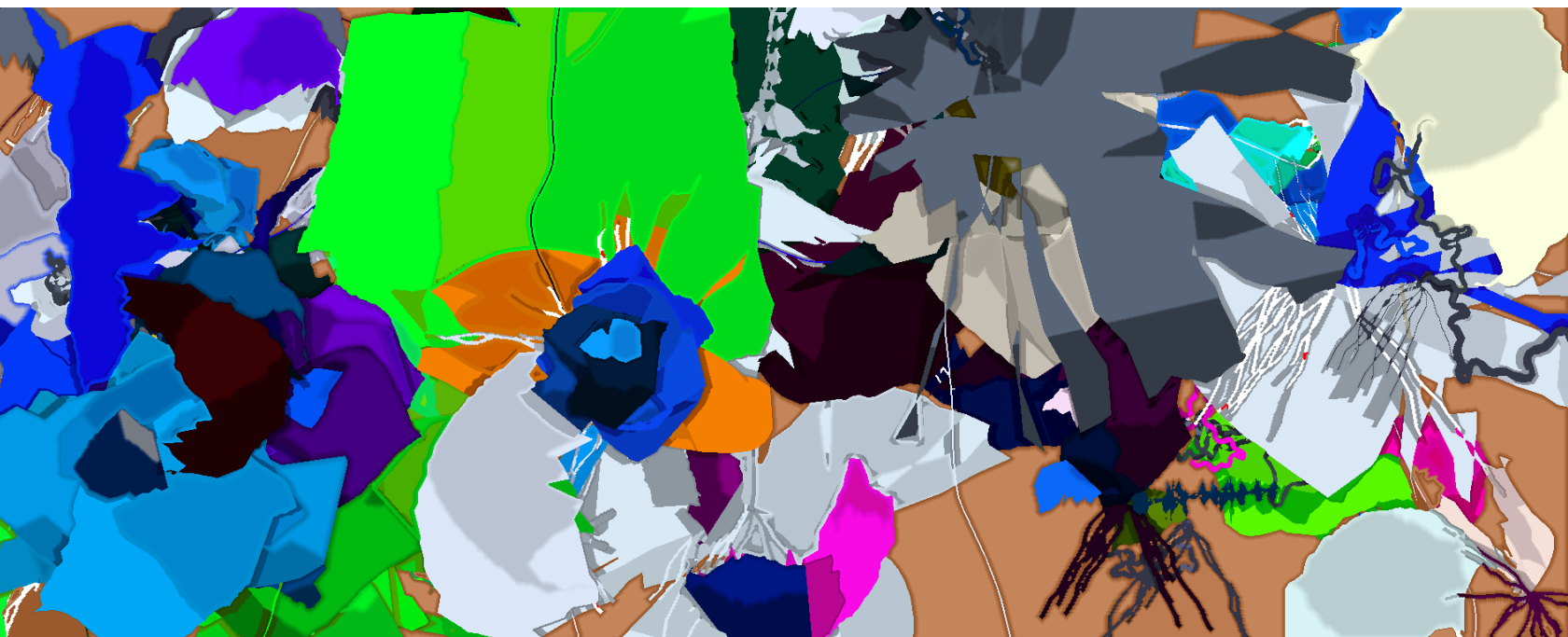
the whole history of human image-making, the artist's intentionality has been mediated by the way you see the hand moving, and by the way you see the artist manipulating the material. I'm pretty sure that part of the reason for this present track, painting what the program has offered me, has to do with being able to physically manipulate material to generate an image. It occurred to me later that that must be the reason why Photoshop gives you this range of fake textures – not that I think any professional would use those things – but for the amateur, you produce an image, and now it seems to be a charcoal drawing. Oh, well, charcoal drawings are made by people! I'm sure that, whether they knew it or not, Photoshop was introducing the appearance of human intentionality into the image.

SB: You know, one of the ways this show has been framed, you call it "Collaborations with My Other Self." So as AARON has developed over time, how do you consider this notion that there is this other self embodied in this system that you've been creating?

HC: I've spent a large part of the last year in correspondence with a psychologist, Louise Sundararajan, who has been building a case that my involvement with the program has had less to do with productivity than it has had to do with creating an 'other' that I could discourse with. The core of the argument is represented in her essay here.



ABOVE: "COX #6", 2010, 25.5" X 20.5"



I think she's right. I think I've come to rely upon the program in a way that would have not been the case 30 years ago. In the first instance I think my relationship with the program was teacher-to-student; that is to say, if I wanted it to make drawings I had to teach it how to draw. Subsequently, for most of my involvement in computing, my model has been program autonomy. I wanted to push the program to the level where it could do things on its own without needing a human being to guide it. It brought me to a kind of crisis actually in this period before the commission thing came up, because one of the factors then was that I had recently introduced a new form generator that was much more general than anything I had done before so that it could actually build forms in a completely different way. So now the program could do its own coloring, it could generate its own forms, it could do its own composition. I suddenly got this feeling it didn't need me anymore. It was almost like I was faced with a divorce or something.

Since then I think there are two levels going on. On the one hand, starting to color things by hand put me back on the track of being able to produce things. The other thing, no less important I think, is that it brought me back into dialog with the program, but in a somewhat different mode than the one I'd lost. I no longer think very much about the program's autonomy. I think of the program as a collaborator rather than a talented assistant. I find now that when I'm working, I move backwards and forwards between the studio and my computer, not necessarily because there's something going on in the studio that I need to do something about in the program, but

because it all becomes part of an on-going dialog. I wrote somewhere that I sometimes think I'm a prototype for the coming cyborg, not in the sense of having mechanical parts to my body -- I already have that, and they don't work very well -- but in the sense of having implants in my brain that are capable of doing things that I couldn't do with the other parts of my brain. The only difference is that my implants aren't in my brain, they're sitting on my desk. But I feel very connected in my relationship with the program now.

SB: Does AARON feel the same way? I think about – as you talk about cyborgs – that it's a very synergistic relationship. It's very dependent on both parts. Not to be morbid about it, at a certain point, AARON might be continuing past his biological partner here.

HC: If you're talking about human mortality, yes, of course.

SB: So AARON could conceivably go on producing work for the future.

HC: Well, AARON could go on producing work indefinitely. The problem has always been that it would go on being the same work. Not the same individual image, but the same formulation which, by the way, is what most human artists do anyway. And they don't do it for the next 200 years, either. To be realistic, I rather suspect that AARON will end when I end, because why would anybody want to take up my other

half? People should build up their own other selves. It's a funny place to find yourself, actually.

SB: It is. And when you started working with computing as an artist, you were one of a very small number of artists at that time were looking at computing. And now so much of contemporary culture is produced via computing means, distributed by computing outlets. Our culture has become one that is computed. Yet your work is still very distinct in that landscape. You occupy a certain idea and notion about computing that is very personal, that is very much your vision of what makes for an interesting relationship between the capabilities of this idea of the computer and your ideas as an artist. There is something that continues to be unique about this project.

HC: Well, I must be, if not the only person, one of the very few people who have worked on a single program continuously for 42 years. If you don't form a relationship with somebody you've talked to, some thing you've talked to, every day for 42 years, there's something a bit odd. Of course, you're right. The whole culture is dependent on computing. There isn't one field – genetics, weather prediction, you name it – that has not just been influenced by computing, but has been enabled by computing. On the other hand, of course, the reason you can go out and buy a computer for \$500 isn't because it can do all these marvelous things, it's



because it's been configured in a way where people can use them without knowing anything about them. Computing has entered the mainstream consumer culture like everything else.

One hundred and twenty years ago Kodak introduced its camera by claiming it was fool-proof. It wasn't kidding around – 'fool' meant 'stupid.' Any stupid ass could use a camera. And then we replaced 'fool-proof' with 'user-friendly,' and we've done exactly the same thing with regard to computing.

When I was still teaching, as you know I established programming as a discipline in the art department and kept doing that until students told me, 'Oh we don't want to learn to program, we just want to learn to use Photoshop.' Photoshop! You don't need a university course to learn to use Photoshop; you just go out and buy a package off the shelf. Mercifully, soon after that. But in the arts, of course, almost nobody has taken the kind of path that I took and some of the other people of my generation took. Everything has to come ready-made; everything has to be taken out of the box and used right away. I probably shouldn't say this because I don't follow it much, but I have the impression that media arts mostly have to do with funny ways to use consumer-oriented products to do things that people hadn't thought of before.

SB: I will say that programming continues to be the core of our Computing in

the Arts program that you were pioneering at UCSD.

HC: I'm very happy to hear that.

SB: We continue with that legacy and that ethos. From our perspective, when we think about the artist and his relationship to his tools, programming is the essential tool for computing.

HC: It's the fundamental discipline, in the same way that drawing was the fundamental discipline up until 50 years ago. Nobody ever learned to be an artist without learning to draw as a first step. And I didn't see how anybody could learn to use computers intelligently unless they did programming as a first step.

ARTIST BIOGRAPHY

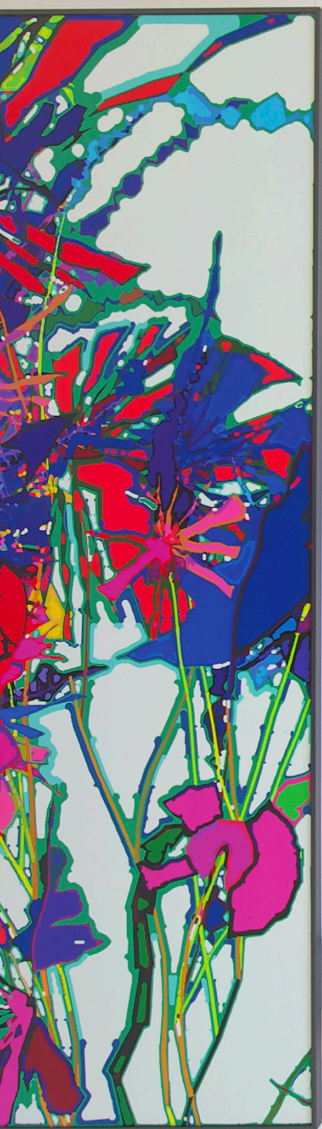
HAROLD COHEN



Harold Cohen, founding director of the Center for Research in Computing and the Arts (CRCA) at the University of California, San Diego, was an English painter with an established international reputation when he went to UCSD in 1968 for a one-year Visiting Professorship. His first experience with computing followed almost immediately, and he never returned to London. Cohen is the author of the celebrated AARON program, an ongoing research effort in autonomous machine (art making) intelligence, which began when he was a visiting scholar at Stanford University's Artificial Intelligence Lab in the early 1970s. Together, Cohen and AARON have exhibited at London's Tate Gallery, the LA County Museum, the Brooklyn Museum, the San Francisco Museum of Modern Art, Amsterdam's Stedelijk Museum, the Museum of

Contemporary Art San Diego and many more of the world's major art spaces. They have also been shown at a dozen science centers, including the Ontario Science Center, the Boston Science Museum and the Los Angeles Museum of Science and Industry. Cohen represented the U.S. in the world's fair in Tsukuba, Japan, in 1985. Cohen's work is represented in many art museum collections worldwide, and by permanent exhibits in the Museum of Computing History and the Carnegie Science Center in Pittsburgh. An acknowledged pioneer in relation to computing in the arts, Cohen has given invited papers on his work at major international conferences on artificial intelligence, computer graphics and art technologies, and his work is widely cited in the literature.





ACKNOWLEDGMENTS

BY HAROLD COHEN

It is a rare and happy event to be told something about my work that I didn't already know. The title of this exhibition, and its formulation, owe their conception to a searching, year-long email correspondence with Dr. Louise Sundararajan. Her essay here is adapted from the much longer paper which she used for her presidential address this year to the Society of Humanistic Psychology of the American Psychological Association. I am in her debt for her unfailing patience and persistence in exploring currents in the development of my work that had long gone unconsidered.

I am grateful for the help and support of Sheldon Brown, who took over from me as director of CRCA a decade ago and moved it onwards and upwards to its present state; this show was undertaken at his suggestion and its realization owes much to his guidance.

No exhibition is ever realized without substantial, but ultimately invisible, effort on the part of many people; let me name them, in gratitude, here. Trish Stone facilitated the exhibition from start to finish. Hector Bracho and his team hung the exhibition with a cool efficiency and a speed that rivalled anything I've ever seen in major museums and galleries. It's always a pleasure to work with a pro, and Hector's a pro if ever there was one. Tiffany Fox not only transcribed a long interview in a way that made it look as if I actually speak English, but was also responsible for a well-wrought feature article. Alexander Matthews (video), and John Hanacek and Andrew Oh (photos) seemed always to be at the right spot for the right shot without getting underfoot – an unusual talent. Will Schipke did the layout for the catalogue in front of you. It took me a while to recognize that Doug Ramsey not only was editing the texts, but had a fatherly eye and a deft hand on the whole production.

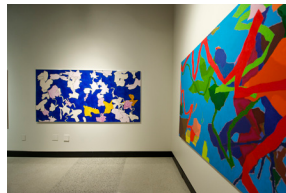


Finally, my thanks to Calit2 for the foresight that has provided a space in which artists can show, not only the wildly varying ways in which computers can contribute to the visual arts, but – perhaps more importantly – the ways in which the arts and computer science together can contribute to the health and well-being of the whole society. For the fact that gallery@calit2 provides such a space on the UCSD campus we should all be grateful.

IMAGE GALLERY

OPPOSITE PAGE: CLOCKWISE FROM TOP LEFT: PANEL DISCUSSION WITH ARTIST HAROLD COHEN, LEV MANOVICH AND SHELDON BROWN; "NORTH OF BURGESS" AND "SETTLING DOWN", INTERIOR OF GALLERY@CALIT2; BOTH 2010; VISITORS EXAMINE "BURGESS ON MY MIND" (2010); PAINTINGS IN CORRIDOR ACROSS FROM THE CALIT2 SERVER ROOM; CLOSEUP FROM "FROM HERE TO THERE" (2010); VISITORS VIEW "COPSE #10"; ARTIST COHEN TALKS TO VISITORS ABOUT "TAKING PLACE" (2011); L-R "BURGESS ON MY MIND" AND "FROM HERE TO THERE", BOTH 2010.

ALL PHOTOS BY JOHN HANACEK/ CALIT2 UC SAN DIEGO



gallery@calit2 reflects the nexus of innovation implicit in Calit2's vision, and aims to advance our understanding and appreciation of the dynamic interplay among art, science and technology.



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