

## Leonardo Educators Forum

### **New Media Futures: The Artist as Researcher and Research as Art in the 21st Century**

Friday, February 24, 5:30 PM- 7:00 PM

Hynes Convention Center, Second Level, Room 202

Chair: **Dr. Timothy Allen Jackson**, Savannah College of Art and Design

“Metaphors and Taxonomies: Art as Basic Research”

Dr. Timothy Allen Jackson, Professor of New Media

Department of Art History, Savannah College of Art and Design

Savannah, Georgia, USA

"On Art Research: Hybrid Projects"

Nina Czegledy, Independent Media Artist, Curator and Writer

Toronto, Ontario, Canada

"Extreme Research"

Professor R. Bruce Elder, Ryerson Research Chair

Director, Graduate Program in Communication and Culture

Ryerson University, Toronto, Ontario, Canada

"From Simulation to Emulation : A Field Theory for Telematic Art in the 21st Century "

Shawn Brixey, Associate Professor | Associate Director

and James Coupe, Artist and Research Associate

Center for Digital Arts and Experimental Media (DXARTS)

University of Washington, Seattle, Washington

Respondent: Jon Ippolito

New Media Professor, University of Maine

And Associate Curator of Media Arts, Guggenheim Museum, New York, New York

# CAA 94th ANNUAL CONFERENCE BOSTON

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Chairs: **Ioannis C. Yessios; Timothy Allen Jackson**, Savannah College of Art and Design

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## **CAA Annual Members Business Meeting**

FRIDAY, FEBRUARY 24, 5:00 PM-6:00 PM  
Hynes Convention Center, Third Level, Ballroom B

## **5:30 PM-7:00 PM**

**SOCIETY OF ARCHITECTURAL HISTORIANS**

### **Creativity and Collaboration in Architecture**

FRIDAY, FEBRUARY 24, 5:30 PM- 7:00 PM  
Hynes Convention Center, Second Level, Room 200  
Chair: **Michael J. Lewis**, Williams College

**CATALOGUE RAISONNE SCHOLARS ASSOCIATION**

### **The Living Artist and the Catalogue Raisonne**

FRIDAY, FEBRUARY 24, 5:30 PM-7:00 PM  
Hynes Convention Center, Second Level, Room 210  
Chair: **Steven Manford**, independentscholar

**COMMUNITY COLLEGE PROFESSORS OF ART AND ART HISTORY**

### **Best Practices: An Interactive Forum**

FRIDAY, FEBRUARY 24, 5:30 PM-7:00 PM  
Hynes Convention Center, Third Level, Room 309  
Chairs: **Thomas Morrissey**, Community College of Rhode Island; **Peter Beal**, Frontrange Community College

**NATIONAL ART EDUCATION ASSOCIATION**

### **Pedagogical Issues Forum: Learning in Studio, Criticism, and Design**

FRIDAY, FEBRUARY 24, 5:30 PM- 7:00 PM  
Hynes Convention Center, Plaza Level, Room 100  
Chair: **Mary Ann Stankiewicz**, Pennsylvania State University

**LEONARDO**

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FRIDAY, FEBRUARY 24, 5:30 PM-7:00 PM  
Hynes Convention Center, Second Level, Room 202  
Chairs: **Ioannis C. Yessios**; **Timothy Allen Jackson**, Savannah College of Art and Design

**FOUNDATIONS IN ART: THEORY AND EDUCATION**

### **Business Meeting**

Extreme Research: Being a Collingwoodian  
Examination of the Proposition that Artmaking is a  
Form of Research

by

R. Bruce Elder

This piece is a report to a *Leonardo* forum on an art project I was engaged in. The opening half draws extensively on R.G.Collingwood's *The Principles of Art*, which I feel offers a bracing corrective to certain proposals on art as research that would reduce the making of an art object to illustrating what is sometimes called theory but would more properly be called a political agenda.

Persistently over the last eighty-five years, artists have declared that their creative enterprise is a form of research, an exploratory activity that bears real similarities to research in the pure and applied sciences. Much of the current interest in the topic of art as research has grown out of the staggering technological developments that have taken place in last three decades- and especially in response to the increasingly important roles that science and technology are having in shaping contemporary culture. Some artists (I consider myself one) have responded to the world-making effects of new technology by becoming active participants in research projects directed at forging the tools that will be used in creating new images and sounds—these artists participate in research and development activities by taking on roles as experimenters and inventors, sometimes extending research agendas of the teams they work with in ways that, but for their involvement, would have been overlooked as too strange or discounted as too impractical.

Common theories about the emergence of the modern idea of the artist as researcher have been of two primary types. Theories of the first type have taken their shape against the backdrop of this giddy technological innovation and they propose that technological development has been primarily responsible for present-day conceptions of the artist as researcher. The artist is the 'antennae of the race,' they say, and the ground-breaking artist of the present, at home in the new world technology is fashioning, is as familiar with computational methods as the artist of the Renaissance was with new developments in the science of colour and pigments. To tie the rise of the idea of the artist-researcher so closely to developments in digital technology seems to me to downplay the important precedents for current ideas of the artist as researcher one can find amongst such pre-digital artists as the participants in Minimalist and Conceptual movements; these artists' early advocacy had much to do with making the idea that art-making is a form of research as commonly accepted as it now is—and their beliefs about art as research had little to do with new technology.

The second type of theory about the emergence of the modern idea of the artist as researcher does not see the rise of that notion as a technologically determined process. These accounts stress instead the extraordinary prestige that science and technology have enjoyed for most of the past three hundred years- and enjoyed especially in the last century. That prestige has led many artists and art theorists to draw an analogy between

art-making and scientific research. Generally, such thinkers have pointed out the following features of art-making that make it similar to scientific research:

1) Art-making proceeds by first identifying a set of research questions that will be addressed. Like scientific research, art-making is grounded in objectives - in an understanding of when how those questions might be answered and a notion of those answers will be reported (or displayed)

2) Artists possess a tacit understanding of the research context for the questions to be addressed. That is, they understand (at some level): why it is important that these particular questions should be answered; what other research (project work) is being or has been conducted in this area; and what particular contribution this particular project will make to the advancement of knowledge, understanding and insights in this area

3) Artists' endeavours are based on implicit methodological understandings: they have some (usually procedurally-based) conception of methods that might be used addressing and answering the research questions. They know how they might go about answering the questions that they have set themselves: they have at least an implicit sense of the rationale for choosing the research methods they do and they possess some sort of understanding of why those methods might be the most appropriate means by which to answer the research questions.

These analogies between art-making and scientific research are striking. This paper constitutes a series of reflections on the claim that art-making and scientific can be so analogised. These reflections are developed on the basis of a critique of modernity's disenfranchisement of non-discursive modes of consciousness, a topic to which I have devoted considerable attention. I have written frequently on the role artwork can play in preserving these devalued dimensions of our being and I remain convinced of the importance of that role. I contend that the crucial value of art in our time - a time that, as Benjamin points out in "The Coming Philosophy," has reduced experience to its nadir - is to re-animate non-discursive forms of experience, no matter how vestigial they have become. We can only understand modernity's implications when we have a way of understanding the modes of consciousness it represses; and we can discover those repressed modes of consciousness only by direct, immediate acquaintance (no matter how enfeebled modernity has rendered that apprehension).

I shall start out with a few remarks on affording "making"—*poiesis*—a place in a humanities curriculum and the university in general, including its research activities. That is, I want to comment on the role *poiesis* might play in an institution whose fundamental purpose is the production and transmission of knowledge. To consider the contribution that art-making might make to the university, let us first consider the difference between art and craft, activities that are frequently confused. This confusion results from ignoring the different relation that obtain between means and ends (or between planning and execution phases) in art and in crafts. Craft understands means and ends as distinct from one another, where means are traversed in order to reach an end. Art-making does not necessarily involve craft ("craft" here used

in the sense of realising ends that have been set before one with clarity). Certainly, much effort, intelligent, purposive labour and self-conscious discipline goes into forming the person who can write a rhythmically intricate line of poetry or can construct a fluid but tightly integrated visual form. Nonetheless, the artist's technique is not the essence of what makes the artist an artist. Of course, I do not mean that a work of art never comes to be realised consequent to a phase of planning. The logic of this matter is compellingly simple: that an unplanned work of art is possible does not mean that a planned (or, what is more truly the case, a partly planned) piece is not a work of art. Still, it seems to me that a work of art usually arises through a process that cannot be neatly divided into a planning phase and an execution phase. It is impossible to imagine how the realization of a craftwork could not more nearly be divided into such phases, but it is possible to imagine that the making of artwork may not be divisible into those phases.

A piece of art is not, in the first place, a physical object—an arrangement of colours or noises. The aesthetic factor comes into being with the experience that the arrangement of colours and noises invites us to apprehend it as meaningful. That is, to evoke a Kantian idea, the arrangement presents itself as purposeful even though that purpose is non-instrumental and non-discursive. Here we confront a major difficulty: how to define what is "meaningful"? I would argue that the arrangements of colours must excite something more than just sensations of colour: it must excite a complex of sensations and feelings. This sort of meaning arises consequent to our feeling ourselves in touch with a total experience of a peculiar sort, an experience of *Zweckmassigkeit ohne Zweck* (of purposiveness without purpose).

How the arrangement of colours or sounds garners the ability to elicit such a total experience, including a sense of meaning, remains something of a mystery, one that we must not tame by conflating art and craft. This much we do know: the ability to arrange colours or sounds in such a way that we are convinced they are "meaningful" results from artist's having handled the perturbation or excitement that first impelled him/her to make the work in a particular way—of having handled them as more than "raw feels." He or she builds a form that correlates with a perturbation experienced but not conceptually and definitively understood. Consequently, this form does not ask to be decoded discursively. As the philosopher of art R.G. Collingwood suggests, the very reason that we are impelled to give expression to feelings is that we want to get clear about them, but to do so in a way that does not corrupt them, as we do when we turn them into discursive forms. We do not know exactly what we are feeling until we have found a form that gives expression to it.

Even this, I believe, misses the most radical implication of the relation of feeling and form. In truth, the activities involved in making art continue the processes involved in perception. The artist's hand does not reproduce what the artist's mind has just perceived. The hand actually plays a role in shaping the perception—hand and mind work together to forge the percept relevant to an artwork. The artist's activities in

making an object are part of the artist's process of experiencing the object he/she makes. The bodily gesture is part of the process of articulating a percept; thus, in artistic perception, body and spirit are at one. Art-making is forming visibility. Visible nature is a welter of intuitions and perceptions, but art gives visibility a splendid order. Art is, therefore, nature transformed. Nature does have a form, for if it did not it would not be visible. But its form is rudimentary. Art takes the rudimentary form that nature offers as a gift and refines and elaborates it. Art-making is a process that carries perception from confusion to clarity, from indefiniteness to exactitude. Natural form and artistic form are not related to one another as *Vorbild* to *Nachbild* (to appropriate Conrad Fielder's terminology for, roughly, "model" and "image"), but rather, as a less definite image to a more definite image. Art-making brings what is incipient in nature to an articulate and well-patterned form in which human consciousness can more adequately comprehend it.

As Collingwood suggests, one explores one's feeling—learns about it, so that it no longer dominates one's affects as an alien force—by expressing it in paint, in sound, in moving images. One explores pain, in sound or in moving images (or in whatever medium one employs), by working out one's feelings in sound or in moving images. This is part of what I meant by saying that what is artistic in artworks does not involve a distinction between means and ends. The medium is not an instrument through which the artist expresses emotion. The medium provides form for an emotion or perturbation the artist is working through- and by giving it shape, it brings it into being. To shift terms slightly, so as to present a different aspect of my idea, the intuition which gives rise to the work art is not separate from the medium.

Not every emotion of perturbation the artist feels while making the work contributes to the form of the work and, reciprocally, not every emotion or perturbation undergoes development and clarification as the form the work is worked out. Only perturbations (emotions) of certain sort are relevant to a work of art. What sort of perturbation? The intuition that gives rise to the poem is as much about words as it is about emotions. The feeling that gives rise to the work is actually a "pre-feeling" and is as much about words (or sounds or traces of movement) as about the self. What is more, until the intuition has been given form in words, one does not really know what it is. We cannot distinguish between the intuition (or feeling) and the expression of the intuition (or feeling) in the form of the artwork. The intuition is not one thing and the expression (or embodiment) of it another thing, a "something" that is made to fit the intuition. The complete experience of the intuition cannot exist until the intuition has been given expression.

The intuition is individualized in the process of being "bodied forth." An intuition (or feeling) does not become what it is uniquely through being compared to something else, through being described, or brought under a category- that was Kant's great point, wasn't it? The poet's urge, or the painter's urge, or the filmmaker's urge is to give body to an intuition or feeling—to the intuition or feeling in all its

peculiarity. Grappling with a feeling, a painter says, "I want to get this completely clear." To get it clear, he or she does not compare it to similar historical works (though painting teachers often make the mistake of assuming that getting student painters to do that is their task). Rather he or she fusses with a line, trying something out, and troubles him- or herself over it, complaining "That's not it," reworking, reworking it again, and again, and again, until, Collingwood suggests, he feels, or she feels, "That is it." This process is repeated over and over, until the painting is finished. Then the emotion, or intuition, has been clarified. Here the task of clarifying our intuitions is not separable from the task of discovering what the medium in which we clarify can do.

That is why one cannot execute an artwork according to a plan. A painter couldn't necessarily give a specific explanation for whatever line he or she was working towards in advance of discovering it. A craftsperson almost always could (though it might take some Socratic probing to have him/her make the plan explicit); but not an artist. An artist works in a state of unknowing. In that sense, the actions the artist engages in are not purposive actions—at least not in the sense that one can educe a purpose for them in advance, and strive to realize that purpose. Making is a form of thinking: through making we clarify our ideas. Scientific thinking can withstand the demands of making one's research question clear—of making clear what would constitute a refutation of one's conjecture. But the thinking involved in art-making cannot. My need to work myself out of a vexing uncertainty evaporates as soon as the uncertainty is clarified. That is why so many artists (here I include myself) can hardly bring themselves to package a work up and send it around—making the work has served the purpose of getting oneself clear about what one was up to, and having made it, one's interest in it is exhausted.

Still, what about work like Ernie Gehr's *Serene Velocity*, a work realised by conceiving a plane and executing it, without deviating from that plan in the least? Is this not evidence that a planned work is possible (and that, against the claim I asserted above, that the process of making a work can be neatly and cleanly divided into planning and execution stages)? I do not believe that examples like Gehr's *Serene Velocity* refute my point. In fact, I would suggest that systems such as that which Gehr conceived and realised to make *Serene Velocity* involve a sort of indefiniteness (I want to say an analog of "ignorance") - and that that incorporation has the purpose of highlighting the uncertainty that characterises every artist's relation to the outcome he or she anticipates when setting out to realise a work of art. Gehr could say of his work what, as painters who have analogous procedures have said of theirs, that he made the work to discover what it would look like when it was done. Gehr could have made *Serene Velocity* to get clear the implications of his original, generative intuition. The system through which *Serene Velocity* was realised throws this aspect of art-making process into high relief—it serves as a meta-comment stating a truth about all art-making. We could say the same thing of other works



that were generated using systems, including James Tenney's *Harmonium* nos 1–5, Udo Kasemets *80 Flowers*, Tom Johnson, *Rational Melody* nos. 1–21, and John Cage's *Music of Changes*.

Most people are not used to dealing with "non-purposes." Contemporary ideas about understanding/knowledge/education make it very difficult for people to speak as though they were in tune with this sort of endeavour. That this is true should be surprising, for one would expect that most people would be familiar with an analogous process in the domain of ideas—the process of struggling to get one's idea clear by finding the words to state it. Nonetheless, it is true.

Collingwood rightly points out that we betray consciousness—betray ourselves—when we seek to avoid the work of getting our ideas (our intuitions or emotions) clear. We betray ourselves also when we consider the medium a mere vehicle for conveying our emotions. We betray ourselves, in our task of getting our intuitions clear, when we fail to explore the medium in which we express them. Consciousness is corrupted when we consider the medium simply a vehicle for conveying ideas or feelings that have already been clarified

But if the instrumentalisation of thinking has rendered it difficult to comprehend how art, as opposed to craft, can take a place in the academy, it also offers an opportunity. I have claimed that art-making is a form of thinking and that through making we clarify our ideas. But every scholarly enterprise does something similar; one engages in some sort of activity and thereby clarifies one's ideas. But are these activities, then, similar through and through? If they are, then why should we argue for the importance of introducing artistic practice into the academy? Could the introduction of art-making into the academy then be considered as having anything specific, anything unique, to offer the academy? To answer that challenge, we proceed by denying the antecedent: If our thinking has been debilitated in being instrumentalised, the value of introducing art-making into the university as a legitimate research activity is that non-instrumental forms of thinking of the sort that artists engage might supplement instrumental thinking, by introducing a new and quite different form of inquire. This new way of resolving a spiritual/intellectual problem will unveil new truths about the human condition. The form of thinking that art-making relies on is not that of an investigation, a "challenging-revealing" a challenging that sets upon what is and demands that it give an account of itself. Real art-making has neither truck nor trade with calculated, investigative questioning. For art-making relies on reflective or responsive questioning, thinking attuned to that which is to be questioned. Art-making is a form of thinking that is closer to what Heidegger names "the piety of thought."

We can now return to that topic with which I began: the analogy between art-making and scientific research. The analogy, we can see now, begins to break down when we consider the respective roles of hypotheses in scientific research and art-making. Scientific research might be described as the systemic effort to refute conjectures (hypotheses). Art-making is different. I have argued (in somewhat Collingwoodian-

Crocean terms) that art-making is not guided by anything like a definite conjecture: art-making is more like an attempt to clarify a vexingly indefinite feeling/idea. Consequently, art-making's epistemological value doesn't arise from the search for instrumental understanding. But if art-making has little to offer in the way of instrumental, discursive knowledge, can it be considered a viable form of research? To put the question otherwise, if the prevalent arguments for considering art-making as a form of research are inadequate, what justification might one have for asserting that art practice should have a role in the academy? In what follows, I shall offer another view of the rise of the conception of artist as researcher.

Art-making, I argue, pulls us back towards ways of relating to the world that are prior to the separation of the subject from the world—pulls us back to forms of understanding quite different from those that instrumental reason affords. Artists do without conjectures so that they can be radically open to experience—they practice a form of radical empiricism. This form of radical empiricism is itself research—"extreme research," one might say, for it opens ways of experiencing that contests the dominant paradigm of knowledge.

This spirit of radical empiricism manifests itself in art-making in two special forms. I do not highlight these forms to suggest that they are the only means by which art-making might return to the primal ways of knowing, or even that they are the best. What interests me is the fact that these ways epitomise the radicality of "extreme research," that they throw the nature of that enterprise into high relief - that and the fact that they have become relatively common. One of these means relies on the use of predetermined forms to generate the structure and form of artworks; the other relies on use of chance operations to generate (at least some of) the elements that constitute an artwork and their arrangement. Both approaches often had the purpose of getting the artist's self out of the way, so that a refreshed consciousness, a consciousness that has become anonymous and universal, could enter into objects presented and appreciate their unique, individual character. Viewers/listeners might experience each event as a being of transcendental value. Thus, in 1974, the "process" composer Steve Reich wrote that his interest was not in the performers' momentary thoughts and feelings or desire for self-expression, but rather from "being told exactly what to do within a musical ensemble, and to find that by doing it well I help make beautiful music. The pleasure I get from playing is not the pleasure of expressing myself but of subjugating myself to the music and experiencing the ecstasy that comes from being a part of it." Or, further, "A performance for us is a situation where all the musicians, including myself, attempt to set aside our individual thoughts and feelings of the moment, and try to focus our minds and bodies clearly on the realization of one continuous musical process."

Some sort of spiritual enlightenment became the supreme goal of Modern artists in their quest for wholeness. The work of Marcel Duchamp provides a case in point. In place of the usual (and often egocentric) insistence on self-expression, Duchamp pointed out that self-centeredness can be removed from the artistic process. In his 'ready-mades'

(anonymous manufactured objects he selected and signed), he generated the idea of art-without-artists, and thus opened even further the opportunity for image-making to everyone. Selecting, he said, is a creative act. Moreover, by often replicating his earlier works, the concept of self moved even further away from the object and opened out toward the not-self. The unification of self and not-self is the ultimate aim of traditional metaphysical philosophy.

John Cage developed another means that aimed at the same end. Thus, in "Composition in Retrospect," he stated:

art = imitation of nature in her manner of operation.

coexistence of dissimilars; multiplicity; plurality of centers;  
"split the stick, and there is Jesus."

anonymity or selflessness of work (i.e., not self-expression).

a work should include its environment, is always  
experimental (unknown in advance).

fluent, pregnant, related, obscure (nature of sound).

empty mind.

no ideas of order.

no beginning, middle, or end (process, not object).

unimpededness and interpenetration; no cause and effect.

indeterminacy.

opposites = parts of oneness.

This is radical empiricism: yet empirical experience of the transcendental particular can provoke an "Ah, Ha!" experience. This is an experience the scientist, too, knows; in the "Autobiographical Notes" he prepared for *Albert Einstein: Philosopher-Scientist*, a *Festschrift* that P.A. Schilpp published in honour of the renowned scientist's seventieth birthday, Einstein wrote

It is quite clear to me that the religious paradise of youth which was lost, was a first attempt to free myself from the chains of the "merely personal," from an existence dominated by wishes, hopes and primitive feelings. Out yonder there was this huge world, which exists independently of us human beings and which stands before us like a great eternal riddle, at least partially accessible to our inspection and thinking. The contemplation of this world beckoned as a liberation, and I soon noticed that many a man whom I had learned to esteem and to admire had found inner freedom and security in its pursuit. The mental grasp of this extra-

personal world within the frame of our capabilities presented itself to my mind, half consciously, half unconsciously, as a supreme goal. Similarly motivated men of the present and of the past, as well as the insights they have achieved, were the friends who could not be lost. The road to this paradise was not as comfortable and alluring as the road to religious paradise; but it has shown itself reliable, and I have never regretted having chosen it . . . for a man of my type, the turning point . . . lies in the fact that gradually the major interest disengages itself to a far-reaching degree from the momentary and the merely personal and turns inward toward the striving for a conceptual grasp of things.

The great variety of the external situations and the narrowness of the momentary content of consciousness bring about a sort of atomizing of the life of every human being.<sup>1</sup>

Nowadays we might express the advantage that accrues to radical research by asserting that the bandwidth of conscious attention is rather narrow in comparison to that of pre-conscious processing.

Like the scientist, the artist sometimes feels that he or she has read the mind of God. This, I believe, is where the research programs of some contemporary artists and scientists intersect. The goal of both the artist and the scientist is discovery that carries us out of ourselves. The route each follows to get that point of intersection, however, remains distinct.

I turn now to an aspect of my thoughts on art as research that I fear may be controversial yet: certainly, they have been greeted with vituperation by the production teacher at my home institution. I have said that art-making is form of thinking, and that through art-making an artist clarifies his/her understanding, and realises something novel about feeling. In that way, art-making resembles scholarly research. I have stressed the unique attributes of the form of understanding that artists arrive at and asserted my belief that this form of knowledge might supplement the discursive knowledge. For instance, I make images of bodies and learn about what I think about bodies by making these images. My thoughts/feelings/beliefs about bodies are clarified by this activity. Does this imply that art-making can stand in the stead of other types of scholarly activities? I believe that it does not. The purpose of the university is the production and transmission of knowledge. Everyone who becomes a part of the collegium of a university commits himself or herself to these purposes: artists who join the collegium are required, as part of their research, to reformulate the knowledge that we arrive at in ways that allows it to be offered to one's colleagues. This is an inescapable obligation. And I don't think that the mysterious process of clarifying our thoughts/feelings/understandings through art-making can really be transmitted. I can work out my thoughts about bodies through making images, but thereby I work them out only in a form that resists conceptual understanding—that, indeed, is its value. I feel

what the images I make say to me.

But I have to take another step—two steps, in fact—to reformulate that understanding so that it my findings can be presented to that on-going conversation the fostering of which is universities' principal purpose. The first step is involves reworking the knowledge into concepts that I can convey to others. This demand puts the artist in something of a dilemma: the special value of the knowledge art-making furnishes is tied to its non-conceptual form. Yet for that knowledge to become a topic in the collegium's conversation, it must be put into conceptual, discursive form. This is admittedly a difficult situation, but I have faith that we can make progress towards a solution. Anyone who writes criticism confronts a similar problem: how to use language to point someone towards experiencing that which resists being put into language. One confronts the problem, and, with sufficient originality, solves it. So it is with the knowledge that art-making vouchsafes: one must find a way to point others toward an experience that resists being put into language. That is the first step away from the purity of non-conceptual understanding that an artist must take to fulfil his/her responsibilities to the collegium.

The second step the artist must take is to put the knowledge that results in the context of the tradition that gives it its meaning. That is necessary if the artist is to enter into a dialogue with other members of the community of scholars.

Those two steps require that the artist perform scholarly duties. A new sort of academic is needed: the artist-scholar. I venture that accepting the artist scholar will enrich the university. The artist-scholar can contribute new ways of thinking about the issues that confront us. Such contributions will be the consequence of introducing a new way of developing/clarifying one's ideas into the academy, ways that will lead to an enhanced appreciation of the mutually creative relation between self and world. To accomplish this, however, the artist-scholar will also acknowledge his scholarly responsibilities.

That was something of a polemical digression. What I want to do now is to report on a project I am working on now that grew out of these reflections such as those I just offered and that attempt to embody some of the unconceptualisable and untheorisable aspects of art-making in the very approach it adopts and to use the computer as a collaborator for working through intuitions.

Stochastic techniques have a long history in music composition, but over the last fifty years they have become much more common. John Cage protested against the idea that an artwork is the product of an artist's feelings—he found the notion that feelings should be allowed to dictate the ultimate form of the work anathema. He believed that the creative process should imitate nature in its manner of operation and he strove to find creative methods that would accord nature a role in shaping the work. For Cage, chance operations figure among the methods that achieve this goal of selfless making. The richness of Cage's writing helped make the use of aleatory techniques common among composers. A composer/music theorist influenced by Cage, James Tenney, made extensive use of measures of similarity in the analysis of music structures in his book

*Meta+Hodos*. It was easy to see that Tenney's ideas on similarity could be used creatively, to put constraints on aleatory processes used to generate series of musical events.

My project explores the possibility of extending these ideas to the visual domain. I have long been intrigued by the possibility of developing analogous compositional procedures for working with sets of images and, in particular, by the possibility of using measures of similarity to constrain random processes. I decided to develop a computer application that would allow me to do this—that is, use measures of similarity to constrain random processes, which would then decide which image-processing methods ("effects") should be applied to frames in a film or video. I began to construct a tool that would emulate my way of working in film but would also extend it, by eliminating subjective whim. I conceived this program as a means that would allow me to collaborate with the machine, to produce "visual compositions."

I worked on this strictly as a non-professional programmer, building a tool for my own use, and used this application in making my last two films. The features I used for an image's signature were its intensity, dominant colours, the mean and standard deviation of its RGB values, the frequency of change in RGB values, the number of areas ("pixel groups") enclosed within a well-defined boundary, the compactness of the principal pixel group, the major and minor axis of the principal group, its circularity and its perimeter.

I was pleased with the results I obtained, and, though I developed the application for myself, I felt that it might be of interest to other film- and video-makers. Existing multimedia software tools tend to reflect an aesthetically conservative bias. The central idea of my project is, (as I mentioned,) to use measures of similarity to constrain random processes used to select image processing methods that will be applied to a set of images. If artists want to have software tools that meet their needs, they will have to get involved developing those tools. They will have to learn something about the art of software development and the sciences of signal processing and artificial intelligence. I feel that my application would, therefore, find wide acceptance among new media practitioners. Accordingly, I wanted to take it further, to introduce a better means for modeling a film- or video-maker's working methods, for capturing a filmmaker's (or videomaker's) understanding of what characteristics of the image make certain image-processing appropriate and others inappropriate.

Along with a number of engineers, I am constructing an application that acquires information from the user about his or her preferences for the image-processing methods to be applied to several reference images. It then selects a group of methods to apply to target images using a random process that is constrained by the degree of similarity between the reference and the target images, and knowledge of the operator's choices regarding the methods that are appropriate to apply to the reference images. Further, some processes adapt to the degree of difference between the reference and the target images.

The enhancements we will introduce can be divided into three categories:

**First**, we will bring aspects of the project into conformity with recognized methods in image analysis and retrieval. We want first to introduce into our metric gauging image similarity some of the well-established methods. Some of these methods to be introduced into the image's signature depend on transforming the image into the frequency domain (using Fourier transforms) and on using wavelet transforms. Further, we propose to introduce more complex mathematical techniques (for example, similarity matrices) that will allow us to more accurately measure the Euclidean distance between images. Efficiencies in the allocation of dynamic resources will also be introduced.

More important, we intend to introduce more vigorous image analysis methods to identify salient features of images. We will investigate the application of a novel perception- inspired segmentation method for indexing and retrieval.

**Second**, we will improve ways the application learns about individual film- or video- maker's working methods. The most significant improvements we wish to introduce have to do with modelling film- or video-maker's working methods. Film- and video makers often possess an "intuitive sense" of what processing methods are appropriate to a particular image, a sense that is hard to quantify by crisp logic. The means we use to capture a film- or videomaker's knowledge has to be reworked from the ground up. Creating a system that would adapt to individual users (and, perhaps, even to individual circumstance) by being "re-trained" could allow for these variations. We will also introduce means to identify relevant features through a mathematical technique known as sequential feature selection and effective ranking, by using a technique known as general recurrent neural networks. These enhancements should enable the software to have a wide range of application.

**Third**, we will expand the range of image processing methods. One emphasis in this enhancement will be on regions of interest (ROIs) To better model a film- or video-maker's working methods, we must also make more extensive use of regions of interest; the application should accommodate sub-image queries, and queries that give a higher weight to features in a specified area of an image, but also take into account the images' overall character.

In expanding the system's image processing capabilities, enhancing methods of geometric distortion will another goal. At present, only a limited number of means for creating geometric distortions are employed—we want to develop a rich set of devices for modifying images' geometry. The image-similarity metric Dr. Guan' s team has developed will be used to determine the degree to which the image would be transformed: this would allow, for example, motion internal to the image to determine the extent to which geometrical features would be altered (for example, the further a given "pixel group" travelled from its place in a reference image, the greater the transformation might be).

1. Originally written for P. A. Schilpp, ed., *Albert Einstein: Philosopher-Scientist*. (Evanston, IL: The Library of Living Philosophers, 1949); reprinted in Albert Einstein, *Autobiographical Notes* (Chicago, IL: Open Court Publishing Company, 1979), 5