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This Week

Research Notes

Articles

Cover: Cells of the retina of a rat's eye can regenerate cut fibers when provided with a living conduit, a segment of a peripheral nerve. The yellow-dyed cell bodies in this image of the retina are those of ganglion cells whose fibers were not cut. The blue-dyed cell bodies are those that sent fibers through the grafted nerve. Because no cells are labeled by both dyes, this experiment demonstrates that the fibers in the graft are not from undamaged cells that have sprouted new axon branches. (Photo: Albert Aguayo)

Departments

Subscription Department
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Letters

Artful invention?

"Computing Art" (SN: 3/1/86, p. 138) raises some interesting questions, including the question of how – and why – a social event such as a painting should be "computed."

The underlying assumption that "art" is located in the minds or "grammar" of people who produce it (or worse, that it is located in the work itself) is very shaky. The cynical maxim, "Art is anything you can get away with," gives the game away. Many, if not most, human beings could develop a grammar and use it to structure a painting. But getting one's creation accepted as "art" is a social process.

There are lots of grammars for almost every human endeavor, and they work – at least the ones we agree upon do. The ones we don't agree on (or don't know about) are not necessarily flawed or weak, and the more interesting question is why some grammars are successful and many are not. This may be a question for artificial intelligence, but I doubt it; an algorithm for predicting what will catch the fancy of enough of the right people at the right time seems fairly (and mercifully) remote.

The Kirsches' grammar for paintings seems a particularly shortsighted and parochial way of construing both art and science. Its only saving grace is perhaps what they are "getting away with" by placing their invention into the socius of both art criticism and computer science. I'm not sure SCIENCE NEWS needs to be in this game, however.

Caroline Arnold
Alexandria, Va.

Imagine a school of highly intelligent but nonetheless illiterate fish coming upon a book of poetry at the bottom of the Atlantic. Using analytical methods of unquestionable rigor they attempt to gain an understanding of the object by examining the shapes of the letters. They discern regularities, structures and patterns but, lacking all knowledge of writing, language, the human world and subject matter of the volume, they soon move on to more rewarding pursuits.

There is something seriously fishy about treating paintings as objects divorced from their origins and context, as though they were something like a seashell whose form had been determined by impersonal, autonomous physical processes. And to select examples on the basis of their suitability to a certain analytical method surely says more about the method than about the objects.

It is hardly surprising that amongst the myriads of man-made objects some should have spatial forms amenable to mathematical or algorithmic representation. While it may be the case that geometrical constructions can be generated which resemble in their formal compositional aspects the finished works of artists such as Diebenkorn, Mondrian or Vasarely, does this really say anything about art? What of the works of Vermeer, Ernst, Monet, Grosz or Magritte?

A venture of this kind may indeed be characterized as a "first step" (speciously and prematurely classed with that of the Wright

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venient location outside the brain. The graft then leads the axons to the appropriate brain site.

This approach is being attempted by Aguayo, working with Fred Gage of the University of California at San Diego and Anders Björklund of the University of Lund in Sweden. In a rat's brain, they destroyed connections that supply the chemical dopamine to the area called the striatum. This surgery produces a characteristic behavior—the rat goes around in circles (SN: 11/20/82, p. 325).

Next, the researchers put fetal dopamine-producing cells into a pouch connected to a PNS graft. They implanted the pouch outside the back of the brain, with the graft making a path to the striatum. The axons from the fetal cells grew into the brain through the graft.

The implant reduced the turning behavior. But when the scientists cut the graft, severing the newly established axons, the behavior returned to the previous abnormal level. "This demonstrates that there is a new pathway and a new source of innervation," Aguayo says.

In this instance, normal function is restored by nerve cells simply providing a chemical. Important questions remain as to whether regenerated axons will be useful in those many parts of the brain where the specific pattern of connections between cells underlies function. Can the axons, all jumbled in the graft, recognize their appropriate connections? Do the target cells in the mature brain still show the characteristics that in the embryo guided incoming axons? As Aguayo asks, "Will the axons smell out the determinants of specificity in the adult organ?"

Aguayo's work on the optic nerve fibers of rats is addressing these questions. In amphibia, he notes, cut optic nerves are able to regenerate and the axons make sufficiently accurate connections to restore the animal's sight. Therefore it is possible, but not yet demonstrated, that with the aid of a PNS graft, a sensory system with all its specific connections could be restored in a mammal.

Aguayo likes to quote an early neuroanatomist who foreshadowed these developments. Santiago Ramon y Cajal, a Spanish scientist, wrote in 1928, "... if experimental neurology is someday to supply artificially the deficiencies in question, it must accomplish these two objects: It must give to the sprouts, by means of adequate alimentation, a vigorous capacity for growth; and place in front of the disoriented nerve cones ..., specific orienting substances." □

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brothers), but it would seem to be a first step toward a sterile dead-end. It may be a clever piece of programming, but it can hardly be called "scientific." As an artist and professional computer programmer myself, it strikes me that the use in this context of computers and so-called "scientific discourse and scientific criticism" will lead to little other than spurious and unwieldly metaphors.

Cecil Bloch
Los Angeles, Calif.

I would be surprised if the "rules and steps needed to recreate the basic structure in a typical Diebenkorn painting" could really be stored in "about 8 bytes of data." If, however, this is true, it would only strengthen my prejudice that there is little substance or content in modern art.

Jeff Grothaus
Cincinnati, Ohio

If there is, indeed, a demonstrable grammar for shape in art, and if this grammar is not an idiosyncratic construction unique to the artist (or at least if this grammar represents some part of an underlying universal set of rules applicable across "school" or culture), then perhaps those linguists who posit some gene for language or grammar would do well to take the step up from specific to generic and begin searching for a basic grammar of representation (or composition) itself, some inherent scaffold on which might be hung words, music, graphic arts, sign language, symbol and even dance, as needed.

It seems more likely that a single basic grammar is applied to each newly evolved form of human communication as it appears, than that a new grammar is evolved for each new form of communication.

W. Gregory Stewart
Los Angeles, Calif.

David vs. Goliath?

The real story in "Millions of Digits of Pi" (SN: 2/8/86, p. 91) was in the last paragraph. That Bill Gosper can compute millions of digits of pi using a Symbolics Lisp machine, when others use Cray-2 supercomputers to do the same, tells us something: There is scope in this world for both brute force and genius, fortunately.

Berthold K.P. Horn
Visiting Professor
Dept. of Electrical Engineering
University of Hawaii at Manoa
Honolulu, Hawaii

Elephantine rumblings

I was interested to read of the discovery by Cornell University researchers of infrasonic communications amongst elephants ("Elephant calls that humans can't hear," SN: 2/22/86, p. 122), but imagine my surprise when a few days later I read the following in *Death in the Dark Continent* by Peter Hathaway Capstick (1983, St. Martin's Press):

From about eighty yards ahead, a low rumble sounding like a very distant mutter of thunder would be discerned intermittently. Once thought to be the noise of moonshine-vat stomachs doing what came naturally with hundreds of pounds of fodder, this weird sound is now accepted by most hunters and scientists to be a proximity signal, a way of locating each other in very thick bush while (possibly) the elephants' hearing is a bit dampened by the sound of their own chewing. That it can apparently be stopped instantly when suspicion of danger pops up seems to bear this out. Ever try to squelch a stomach rumble in the middle?

Perhaps Cornell and the World Wildlife Fund could save some research money by reading Capstick's books.

Harvey Wysong
Atlanta, Ga.