

*I was interested in ideas - not merely in visual products.  
I wanted to put painting once again at the service of the mind.  
Painting should not be exclusively retinal or visual;  
it should have to do with the grey matter, with our urge for understanding.*

**Marcel Duchamp**

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## VISIONS OF MIND

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Computer art is unfolding on the basis of scientific and engineering achievements of pioneering personalities whose vision suggested that it should be possible to wrest something other than calculation speed and numeric precision from those crude and clumsy computers, something that could be turned into meaningful images. They set out to build dedicated machines to interpret an intuitive stroke with a pen or a snapshot taken through the lens of a camera. They designed displays that show more colors and change images faster than the human eye can distinguish. They devised software to generate pictures that appear just like photographs of reality. All this has been accomplished within the short timespan of two or three decades. The history of computer graphics reads like a tremendous technical success story.

Conceptually, the way had been paved by Alan Turing's contributions even before the first computer had actually been built. Turing had reasoned about the ability of a computer to act intelligently. He realized that all a machine needs to perform are read and write operations on sequences of symbols. These symbols can represent anything, obviously numbers, but similarly, letters, or as we commonly know today, colors, geometries and other visual features. Symbols can be arranged in larger complexes to stand as tokens for aspects of reality or fictional models. The computer serves as a dynamic symbol processor by altering any given symbol in any order. Turing compared the machine's functions to humans' use of language. He argued that both activities share the processing of symbols, the only mental phenomenon whose results are directly observable. Thus, he concluded, the computer can exhibit the same intelligence we attribute to human beings. In principle, a general purpose computing machine was conceived. In one of its incarnations it can act as a universal image generator. [ 1 ]

Turing's inferences remain hotly disputed, since they bluntly grant intellectual powers, believed to be in the exclusive possession of humans, to machines. Opponents argue that even if a machine could conduct limited rational reasoning it could never exhibit genuine creativity. They define creativity as the production of something original, something without precedence. Creativity implies the capacity to voluntarily break those rules, that are slavishly executed by logical deduction, and consequently, is considered integral to artistic pursuits. Modern art in general disregards existing value systems and continuously posits completely novel conditions. Academic codifications of art have been undermined and extended by an ongoing succession of new art movements, manifestos, and methods.

By severing its ties to the social context of religious and political rituals art became the essence of truly personal experience that is condensed into special forms of individual expression. Because each piece of art is unique as a symbolic manifestation of the spiritual potency and handicraft skills of its creator, it is considered to be precious both in immaterial and marketable terms. This foundation of art was never questioned, until Marcel Duchamp invented his 'readymades', utilitarian, prefabricated mass products that he chose to elevate into the domain of art, simply by declaring them to be art. Duchamp's surprising gesture of placing an ordinary, industrially manufactured urinal as a piece of art into the sacred halls of a museum shocked even the liberal consensus of the avantgarde. This 'readymade' had not been ennobled by the creative hand and spirit of the artist, and to make matters worse, it directly confronted the public with issues that were suppressed because they were considered obscene. A scandal was inevitable. [ 2 ]

With one innovative stroke Duchamp shattered the endless cycle of discussions about validity and virtue of this or that "ism" and radically probed into the very foundations of art. His ironic questions remain unresolved but continue to influence the contemporary understanding of art. Duchamp's 'readymade' was the result of his sharp reasoning about the impact of industrialization on art. It was fashioned to ridicule the closed circuits of anarrow-minded artworld. The 'readymade' discarded with a Gödelian "jump-out-of-the-loop" all prevalent aesthetic criteria for judging art. [ 3 ] It seems to me that our time is ripe for an equally strong and convincing statement that reflects on the dramatic changes inflicted by the computerization of factory, office, home, and of course, art. In analogy, such an artifact would take the very subject it covers into account and proudly proclaim itself 'machinemade'.

The outstanding and farsighted work of both Turing and Duchamp delineates the intersection of contemporary art and computer science. At times like these when new territories are being staked out, proven methods and yesterday's guidelines are bound to fail. But not only practicing artists are thrown back upon their personal judgement, critics and audience alike should seize the opportunity to scrutinize closely and discuss frankly the repercussions and extensions computer technology is bringing to the arts.

A majority of artists use computers today to further cultivate their expressive vocabulary and to take advantage of the digital dynamics within the production process. In essence, they are either replacing traditional tools with sophisticated computer simulations or integrating computer imaging techniques by applying them alongside conventional methods. In the later case multi-media pieces are often collaged out of different image sources and materials. This approach helps to turn the highly malleable, but intangible computer image into a durable work of art. Other artists follow routes that experiment more directly with the procedural character of the imaging technology. They address topics such as change, chance, and chaos, and visualize them in unusual formats such as combinatorial clusters of a complete picture space or multiple exposures of a gradual evolution.

Computer art provides exciting visual 'thought experiments', that would not be possible in other domains of human endeavor. A far-out example is the depiction of the internal memory of a computer.

Patterns of behaviour and organic growth processes are modeled in challenging and formidable attempts. Even Turing's far reaching philosophical suggestions are being implemented in automatic drawing systems that simulate visual cognition. Computer environments represent the changing states of mind of an artificial 'time entity'. Finally, Duchamp's dictum, "It's the onlooker who has the last word", gains fresh meaning vis-à-vis the participatory potential of interactive computer installations that invite the audience to realize a very personal version of one particular piece of computer art.

In my own view, good computer art, like any good art, goes far beyond the thin skin of its physical surface. At its best it is smart art that can stimulate via visual symbols a rich variety of retinal as well as mental activities. These symbolic artifacts vividly trigger our perception and successively lead to deeper levels of cognition. Symbols are like shadows cast by the internal state of an organism, shadows that can be registered meaningfully by the counterpart in a dialogue. How are we to tell whether the originating organism is a human being or a machine? What matters in the end is that ~~only through the eye of the beholder is an~~ image activated and serves as the evocative agent that touches our mind, heart, and soul.

References:

- [1] Alan M. Turing, *Computing Machinery and Intelligence*. in: Douglas R. Hofstadter, Daniel C. Dennett (eds.) *The Mind's I. Fantasies and Reflections on Self and Soul*. Bantam Books, New York 1982, pp. 53-67
- [2] Calvin Tomkins, *The Bride and the Bachelors. Five Masters of the Avantgarde*. Duchamp, Tinguely, Cage, Rauschenberg, Cunningham. Penguin Books, New York 1976, pp. 9-68
- [3] Douglas R. Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid*. Vintage Books, New York 1980