

Creating New Forms: Art, Technology, and the Imagination

Eric Jones, Richard Stockton College of New Jersey

Machines and technology have always conflicted with traditional handcrafts. The tension is that the machine has always been sought out to replace the handwork of a person to make the work easier or more productive; thus, less knowledge or skill is required. Nevertheless, by constructing mechanical devices that replicate handwork, we use up more time in contemplating our initial motive to create something. This approach leads artists to reflect upon what they are creating, rather than on how they are creating it. In his book *Visions of the Future*, Clifford Pickover writes, "Our cognition becomes more imaginative as twenty-first century computers and art will provide humankind with an unlimited landscape for exploration, and unparalleled aid for the imagination" (vii). Advancements in technology and computer aided arts allow artists to explore new forms of artistic representation that will place a greater emphasis on the imaginative and aesthetic qualities of art. Computer modeling programs allow sculptors to view their work in virtual reality before it is produced. Artists can produce works of art that are more closely aligned to their original intentions, furthering the precision of execution in an artwork, thus leading to more truly realized forms of the imagination.

The use of new technologies throughout history has always affected the way artists create their work. The photograph created an astounding impact on modern art as artists responded to photography and also implemented it as an artistic tool. Current technologies have similarly allowed artists to use new tools to produce their work with completely new artistic processes. By exploring how technology has impacted the world of art, artists can gain a

better understanding of how to create new forms and processes that older artists have not yet considered.

Photography: A New Creative Process

The question of how best to use new technologies in the fine arts is not new. During the fifteenth century, printmaking was adopted by artists for its reproductive value, and in the nineteenth century, photography was accepted as one of the fine arts. The printmaking process was adopted by artists for its capacity for mass production, and since it is a handcrafted process, it was not as contentious as photography in becoming an accepted medium in the fine arts. As George Ehrlich points out in his book *Technology and the Artist*, "To the nineteenth century artist, photography represented two very basic problems. The first was the simple matter of competition... but in addition to this, photography also seemed to challenge a fundamental prerequisite for art, the need for a disciplined hand-craftsman in the creation of art" (217). In the nineteenth century, the ever important function of creating an art object by hand was being diminished by science and technology, and many traditionalists discredited photography because of this technicality. Nevertheless, with or without the credit from conservative artists, photography still developed because of its industrial and commercial advantages. The early success of photography in industry and business is due to its swift, economical techniques, its accurate, pictorial representation, and its quality reproduction of images (Ehrlich 219).

As the camera led artists to question the validity of photography as a fine art, painters began to rethink the definition of painting since photography assumed the functions of representational art. At the beginning of the twentieth century when photography prevailed as

the dominant representational medium, painters were hard-pressed to expand the terms of what a painting could be, and thus painting underwent a dramatic change toward abstraction. Although photography did not singlehandedly cause artists to consider new modes of painting, it certainly had an impact on artists at the time. In reaction to Edward Muybridge's successful documentation of photographing a horse galloping, Thomas Eakins painted *Fairman Rogers Four-in-Hand*, which portrays a horse galloping more in accordance with Muybridge's photographs rather than with previous paintings of horses, where artists had only assumed the way a horse would appear in mid-gallop. In his book *Mighty is the Charm*, J. Clifton Albergotti states, "The popular opinion was that a horse could not possibly be airborne at any time during the trot, . . . but the scientific pictures showed that not only did the horse become airborne, but it did so when all four legs were jackknifed beneath the animal" (217-219). Eakins, being a scholar of both science and art, was one of the first artists to apply recent advancements and discoveries in photography to painting.

Another advancement in science and technology that precedes photography and is undoubtedly connected to it is the implementation of the *camera obscura* in fine art. Similar to the photographic camera, the *camera obscura* creates a projection of light onto a dark screen, but without the ability to capture the image on a surface. The seventeenth century Dutch artist Johannes Vermeer is believed to have used this device while preparing his paintings. Today the photographic perspective is commonplace, but in Vermeer's time the use of this device must have been a novelty, producing an effect that surprised and delighted his viewers. Thus, science has subtly altered the way in which an artist perceives the world. According to Albergotti, "The *camera obscura* was a starting point for the artistic imagination but not the

total explanation of Vermeer's art" (190). Vermeer's use of the *camera obscura* is an example of an artist using a scientific and technological advance to produce art that is more closely aligned with his imaginative view of it. With such ideas about the nature of art and the nature of the artistic vision in the air, it is not surprising that an automatic device in sync with the human eye found favor with some painters (Ackerman 331). Through an historical lens, we can see the implementation of science and technology in art and how it has affected the way artists produce their work. Vermeer's use of the *camera obscura* was an innovative process and a predecessor for the transformation that the invention of photography unraveled during the nineteenth century.

The young Marcel Duchamp, before he invented the infamous "ready-mades," once tried his hand at painting; his most celebrated painting is a direct response to photography and movement. This painting, *Nude Descending a Staircase*, creates a sense of movement that is directly linked to the camera and motion picture. While explaining *Nude Descending* in an interview with Pierre Cabanne, Duchamp said, "When you want to show an airplane in flight, you don't paint a still life. The movement of form in time inevitably ushered us into geometry and mathematics. It's the same as building a machine" (31). His comparison of painting a picture to building a machine is a direct statement of how modern technology affects the way artists think about and produce art. Duchamp, soon after painting the *Nude Descending*, stopped painting altogether to work in new mediums of art, many of which were related to machinery, humanoid robots, hand-cranked optical illusions, and mechanical drawings. His grouping of art with the machine is a primary example of how technology led to forward-thinking artistic achievements. Like Duchamp, many nineteenth century artists used modern

technology either to produce or to inspire their art. The current notion of modernity in the arts was not formally realized until the Futurists and the Precisionists emerged. The Futurists, such as Gino Serverini, Umberto Boccioni, and Giacomo Balla, were interested in movement and technology to produce extreme sociological change. Among the Precisionists, who aimed to celebrate the architectural and industrial forms of the American landscape, were artists such as Paul Strand, Louis Lozowick, and Charles Sheeler. In Sheeler's photograph, *Industry*, he focuses on the complexity of an industrial setting as an abstract composition of overlaid images. Here Sheeler uses machinery not only for the inspiration but also for the production of his art. Although his work is compositionally complex, Sheeler is also using a conceptual idea in this photograph. Since the piece is divided, there are three individual photographs, but they are also parts of a much larger work, much how the parts of a machine fit together. Sheeler is not merely representing machinery; rather, he is conceptually referencing the way an industrial machine is constructed from many individual parts that work together with one larger motive. He also shows a worker in the photograph, suggesting that men are the creators of machines and are ultimately in control of the machine's purpose. Sheeler is also signifying through his photography that machines are the products of humans; therefore, whatever is made by a machine is ultimately the product of human participation.

In Miles Orvell's book, *After the Machine*, he explains the use of machinery as an art subject in Precisionist photography:

The camera, in the hands of the modern artist, was functioning as an instrument for reforming perception, a way of relating the new vision to technology and art, which became the foundation of Precisionists and of the American contribution

to international Modernism. Rather than seeing technology as a force that intervened between the individual and reality, the machine became a way of creatively 'deforming' reality and even mastering it. Technology became a creative force for the artist by being defined as a new 'screen' or 'filter' through which the world was experienced. (9-11)

Orvell has importantly noted that early twentieth century artists were using technology in their creative processes to bring about new forms of existence. Science and art, although separate from one another, can also be directly related, as seen in Sheeler's *Industry*. Sheeler, like many of his contemporaries and those after him, implicated technology to explore new modes of creativity and imagination.

The artists who accepted photography's role in the pictorial arts and reacted accordingly have now been recognized for their novel innovations in painting and avant-garde thinking. In short, an acceptance of photography meant more than an admission that science and technology were important influences; it also meant recognition of the fact that older standards were no longer applicable (Orvell 220). Photography not only replaced illustrative, pictorial painting, but paradoxically aided its progression in modern art as painters reacted to photography's dominance in the illustrated field. The invention of new technologies enables artists to implement new tools for novel creations that have not previously been revealed by past artistic practices. In his article "The Abstraction Paths: From Experience to Concept," Bernard Gortais states, "Works of art bring out certain aspects of reality that were not perceivable before. They express, but not in so many words, that the world is vaster than we believe" (1244). As seen in the above examples, the camera as an artistic tool led artists to

experiment in numerous ways. By utilizing machinery in art, artists can begin to explore artistic forms that push the boundaries of what can be represented in reality.

Imagination and the Machine

Today the combination of technology and art can be seen in the computer and industrial fields. These fields are even more in tune with projecting the artist's imagination into a concrete reality now than at any other time in the past. Because modern technology easily enables us to make correlations between imagined art objects and their physical representation, artists can envision their creations more accurately than ever before, thus furthering the artistic endeavor of combining imagination with reality. In "Aesthetics: Lecture on Fine Art," Hegel expresses the demand that the idea and its configuration as a concrete reality should be made completely inter-changeable with one another. In this way, the Idea as reality, shaped in accordance with the concept of the Idea, is the Ideal (Hegel 69-90). Hegel's philosophy of the Ideal (a perfect configuration of Idea in reality) is even more relevant today as recent artists have implemented new computer and industrialized technologies into their creative processes.

It is within the creative process that the Idea and the physical form of art come into correlation with each other. Since the imagined object or idea exists only theoretically, it is the job of the artist to construct it into concrete existence accordingly. The abstract nature of the imagined object then demands that the artist consider the object in detailed exactness before the artistic process can be carried out. The artist may sketch or create a model before he carries out any final production in order to achieve a more exact execution. Because of his/her

desire for enhanced accuracy of representation and execution, the artist then considers the applications of new technologies in the creative process.

With the use of computer numeric controlled (CNC) machines, sculptors can work in detail with a number of materials, such as wood, stone, plastic, and metal, with little hands-on application. Since the physical labor and handcraftsmanship have been reduced to a minimum because of the machine's milling process, the artist can spend more time thinking imaginatively, rather than focusing on the outward representation. Here, Hegel's first demand of art is met as the content that is to develop into artistic representation should be in itself qualified for such representation (69). Today, artists are able to create three-dimensional models of their work in computer-aided design and drafting (CADD) programs, which allow them to see an accurate representation of their art before it is constructed. These advances in technology have allowed artists to bring their imaginations to the forefront of artistic representation.

As a result, the artist is now more easily able to create art in accordance with his/her Idea. This process demands a greater focus on the aesthetic form of the object. As models are created, they begin to adopt certain formal characteristics of art, such as line, shape, and texture. Hegel writes, "The forms of art are nothing but the different relations of meaning and shape, relations which proceed from the Idea itself and therefore provide the true basis for the division of the sphere" (80). In CADD programs, artists can experiment with these formal elements to produce the correct relation of forms in accordance with the Idea. Editing a drawing does not necessarily entail re-drawing an entire page, as it often did when drawings were produced by hand. Using CADD programs, architects can easily add or remove lines on

their drawings. As a result, some work can be completed much more rapidly (Thurk and Fine 114).

During this process, the model is subjected to Hegel's three relations of the Idea to its configuration. These three forms are the symbolic, the classical, and the romantic. As the model is being rendered, its first representations are in relation to the symbolic form of art since it is a mere search for portrayal rather than true representation; the Idea has not found the form even in itself and therefore remains struggling and striving after it (Thurk and Fine 81). During this stage, the artist has not yet created a finalized, concrete form, but instead must experiment with the abstract, symbolic form until it coincides with the Idea. If certain features of the model do not correspond to the imaginative qualities of the Idea, the model must be reconfigured to fit the demands of the design. Here the artist is creating his model through a learning process called situated cognition. According to the theory of situated cognition, every human thought and action is adapted to the environment, that is, situated, because of what people perceive, how they perceive their activities, and what they physically develop together (Clancey 1-2). In these new modeling processes, CADD programs become the situated environment in which the work is developed from a system of decisions determined by the artist.

According to Hegel, "When the symbolic form is shaped adequately, it then passes into the classical form of art. The object as envisioned by the artist has now come into true representation. At this point, the classical art-form is the first to afford the production and vision of the completed Ideal" (83). Although the classical form of art is the epitome of true representation, Hegel stresses that its restrictedness lies in the fact that classical art is solely an

external representation of the Idea and does not reflect the inwardness of self-consciousness; therefore, Hegel regards romantic art as the highest art form. Since classical art strives only for complete mimesis, its potential for uniqueness and originality is limited.

The romantic form of art, on the other hand, searches for this particular originality. In this stage of the modeling process, the question of qualified individuality comes to the fore. Since the art object has come into true representation, it is now the job of the artist to decide which characteristics of the object reflect its own distinctiveness and inward nature. In Leo Tolstoy's dissertation "What Is Art?" he gives the example of a boy reliving a story; Tolstoy states, "If only the boy when telling the story, again experiences the feelings he had lived through, and infects the hearers and compels them to feel what he had experienced--it is art" (171-73). The romantic art form, therefore, transcends external material and causes the artist or viewer to look inward toward the spirit and the inner beauty of him- or herself. Inwardness then triumphs over the external existence of the object by manifesting the imagination.

These new tools are contentious in the art world because traditional sculptors believe that the art works produced with CADD and CNC do not require as much skill as traditionally produced artwork; however, this view discounts the fact that the evolution of art has been made possible due to the evolution of technology. The printing press, the camera, and the computer are all tools developed from technological innovations that have been adopted by artists. It is only natural that the evolution of art is enhanced by advances in technology. Jon Isherwood, a sculptor and co-founder of the Digital Stone Project in Mercerville, New Jersey, has commented on the implementation of CNC machines in his art in the magazine *Stone Business*:

It's a fine line, and one hopes in the end that the objects carry through for themselves and they have beauty and presence, and that the technology is just in support of it. I hope that in the end, the work that the layperson—the person that doesn't know the technology—only thinks about the beauty of the object rather than the technologies. (33)

With help from modern technology, artists can close the gap between the Idea and its representation. We must now consider Hegel's notion of the creative act, described in his book *Philosophy of Mind*; he states that artistic production belongs to the genius or particular endowment of the artist and is at the same time a labor concerned with technical cleverness and mechanical externalities (295). Therefore, the production of an artwork results from a particular advantage that the artist has been fortunate to acquire. The best art object is a result of perfection in execution of the art object, and that is exactly what modern technology has to offer the artists of today. The newly created abilities of modeling programs are extending the possibilities of human control over what the machine can make, closing the gap between what artists can foresee in their minds and what they can hold in their hands. Technical cleverness and mechanical externalities have finally caught up with Hegel's notion, and now artists can see exactly what they will produce before they can touch it.

Reproduction and Artistic Enquiry

Using digital and mechanical production to create art raises the consideration of mass production. It seems, now more than ever, that artists can easily reproduce their art on their own or in a manufacturing plant. In the renowned book, *The Work of Art in the Age of Mechanical Reproduction*, author Walter Benjamin states, "Even the most perfect

reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the place where it happens to be. This unique existence of the work of art determined the history to which it was subject throughout the time of its existence”

(3). This statement seems to be warning those who are implementing such industrial processes of technology to reproduce original works for monetary or commercial value, implying that they will degrade unique forms of their artistic value. It is in the hands of the artists to keep their work limited because repetition and saturation of the same object will diminish its beauty and authenticity in the public’s eye. Duchamp also restricted the number of ready-mades he produced because he realized the danger of indiscriminately repeating this form of expression, so he decided to limit his production of ready-mades to a small number yearly. In *The Writings of Marcel DuChamp*, the artist states that he “was aware at that time, that for the spectator even more than the artist, art is a habit forming drug and [he] wanted to protect ready-mades against such condemnation” (qtd. in Peterson and Sanouillet 142).

With the use of CADD programs and CNC machines, sculptors can, without a doubt, make exact replicas of their art, but when does replication lead to art losing its uniqueness? Benjamin would probably argue that the authenticity is diminished the instant that the second replica is produced because the second one does not possess the original aura of creation that was exhibited in the first. Nevertheless, a lot has changed since Benjamin wrote his manifesto on the effects of mass production of art. Art can now be viewed with the click of a mouse because the internet is saturated with images of art objects. This development certainly does not mean, however, that original works of art,

such as Picasso's *Guernica* or Leonardo Da Vinci's *Last Supper*, have lost their authenticity just because they can be seen virtually anywhere in the world via the internet. As Benjamin's statement implies, the originality of art comes from being in the presence of the artwork itself, not from viewing a mere replica, like a print of a painting. On the other hand, what if the original were produced in the same way that the replica was produced, as is the case of artists who work with CNC machines? In this situation, the only thing that differentiates the original from the copies is the amount of time and contemplation that the artist puts in to complete the model, and even then, the object does not actually exist. Therefore, the value of originality does not specifically refer to the art object, but only to its theoretical enquiry.

The art image as a non-tangible representation then poses the question of whether artistic enquiry itself can be a valid form of art. This question implies that artists do not necessarily need to produce or make objects, but rather that they must contemplate and inquire about the true meaning of art and its relationship to art objects. This mode of thinking is directly related to science. The former president of the British Society for Social Responsibilities in Science wrote that there is a growing tendency for artists to regard their work as an enquiry, an open-ended activity that does not aim at producing an object but nevertheless provides a defined statement. Science may also be seen as an open-ended activity producing statements about nature, rather than providing final truths. In rebuilding our culture, science may be integrated with art to broaden human enquiry (Wilkins 172). With modern technology and achievements in developing new artistic processes, art and science have been integrated in two modes: the mode of

enquiry and the mode of production. The use of modeling programs allows artists to experiment freely without any direct objective results, yet once the form is sufficient for representation, it can be produced through certain processes using modern technology. There no longer needs to be a gap between the experimental and the concrete as they both can now be merged into one process to produce innovative forms of art.

Whether it is in our email or our iPhones, hundreds of programs and applications on our computers, telephones, televisions, cameras, and iPads dictate the way we behave and communicate. These new ways of communicating cause modern people to think and operate differently from the ways that people did in the past. Research, shopping, travel, leisure time, and entertainment are only some of the widespread cultural behaviors that have been changed by modern technology. It is a rare occasion that someone actually writes out a check due to the ever growing number of check and debit cards that most consumers use.

These recent trends in our culture can certainly have an impact on the arts. Just as consumers use technology to make things easier, so do artists. As computers affect the way we live, they also influence the way we develop our creativity and imagination. CADD programs, along with programs like Adobe Photoshop and Adobe Illustrator, allow photographers, graphic designers, architects, and sculptors to explore new ways to envision and develop their work. These types of computer programs will allow artists to bring new forms into existence. As Pickover states, "The computer only acts as a tool. The process of creativity and imagination has to take place in the artist's fantasy as always. But the electronic tools, consisting of hardware and software, differ enormously from traditional techniques" (88). As even more computer programs develop in the future, the processes of human-computer interactions will

become even more sophisticated, allowing artists to realize their imaginative work with greater efficiency and straightforwardness.

Perhaps the most ambitious goals for computer-human interaction are found in recent efforts to create “virtual realities” via computers. Virtual reality, more so than any other media described here, appears to have the potential to produce ground-breaking material and to change our world in fundamental ways (Pickover 62). Artists, computer program developers, and production manufacturers should be able to work together to develop intelligent technology that would benefit the creative visual arts. Not only are artists beginning to explore this new and seemingly infinitely flexible medium or meta-medium with the potential for a new role for art, but in my opinion, they should also become directly involved in developing this new technology (Pickover 193). As program developers and artists work together to expand these new technologies, human-to-program communication will become more responsive and versatile. A more versatile and responsive system will make artists’ methods of modeling less elaborate, enhancing the construction of imagined objects in both the virtual and actual worlds.

Art has always adapted to the presence of contemporary technology. In effect, artists have adopted technologies and used them in multiple ways to produce vast numbers of ground-breaking and novel artworks. Since art must exhibit intrinsic characteristics that account for its originality and given that modern technology both aids in the representation of art and manifests its presence, technology will continue to be applied in the creation of new forms and modes of artistic development. In fact, it is the responsibility of modern artists to control new media in order to expand the potential for creating new forms of art.

Works Cited

- Ackerman, James S. *Seventeenth Century Art in Flanders and Holland*. New York: Garland Publishing, 1976. Print.
- Albergotti, J. Clifton. *Mighty is the Charm*. Boston: University Press of America, 1982. Print.
- Benjamin, Walter. *The Work of Art in the Age of Mechanical Reproduction*. New York: Classic Books America, 2009. Print.
- Cabanne, Pierre. *Dialogues with Marcel Duchamp*. London: Da Capo Press, 1979. Print.
- Clancey, William J. *Situated-Cognition-Representations-Computational-Perspectives*. London: Cambridge University Press, 1997. Print.
- Ehrlich, George. *Technology and the Artist*. Ann Arbor: University Microfilm International, 1976. Print.
- Gortais, Bernard. "The Abstraction Paths: From Experience to Concept." *Philosophical Transactions: Biological Sciences* 358.1435 (2003): 1,241-1,249. Print.
- Hegel, G.W.F. *Aesthetics: Lecture on Fine Art*. London: Oxford Press, 1975. Print.
- . *Philosophy of Mind*. London: Oxford University Press, 1978. Print.
- Isherwood, Jon. Interview by Emerson Schwarzkopf. *Stone Business*, Western Business Media, February 2006. Print.
- Orvell, Miles. *After the Machine*. Jackson: University Press of Mississippi, 1995. Print.
- Peterson, Elmer and Michel Sanouillet. "Apropos of 'Readymades.'" *The Writings of Marcel Duchamp*. New York: Da Capo Press, 1973. Print.
- Pickover, Clifford A. *Visions of the Future*. New York: St. Martin's Press, 1992. Print.

Thurk, Jessica and Gary Alan Fine. "The Problem of Tools: Technology and the Sharing of Knowledge." *Acta Sociologica* 46.2 (2003): 107-117. Print.

Tolstoy, Leo. *What is Art?* London: Oxford University Press, 1930. Print.

Wilkins, M.H.F. "Possible Ways to Rebuild Science." *The Social Impact of Modern Biology*. New York: Columbia University Press, 1971. Print.