Postdigital Dysfunction in Digital Visual Art and Art Education

Disfunción postdigital en el arte visual digital y la educación artística | Disfunção pós-digital na arte visual digital e na educação artística

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Abstract:

Postdigital works of art disrupt utopian narratives of progress and perfection upon which much digital art is based. Postdigital works of art present socially relevant and critically potent opportunities for art educators to analyze these narratives, through dysfunctional forms of making that simultaneously draw from the past, present, and future. In this article, historical examples of visual art that use and address developing technologies will first be discussed, identifying utopian and dystopian themes. Next, the postdigital will be employed to analyze select digital visual works of art that further expand these themes. And finally, these postdigital works of art will be brought into a discussion with theories drawn from contemporary digital visual art education, with the goal that art educators can leverage the critical ways of making that these works of art represent.

Keywords:

Postdigital art. Digital visual art education. Glitch art. Dysfunction.

Resumen:

Las obras de arte postdigitales alteran las narrativas utópicas de progreso y perfección en las que se basa gran parte del arte digital. Estas obras presentan oportunidades socialmente relevantes y críticamente potentes para que los educadores artísticos analicen estas narrativas, a través de formas disfuncionales de creación que se inspiran simultáneamente en el pasado, el presente y el futuro. En este artículo se analizarán en primer lugar ejemplos históricos de arte visual que utilizan y abordan tecnologías en desarrollo, identificando temas utópicos y distópicos. A continuación, se empleará lo postdigital para analizar obras de arte visual digital seleccionadas que amplían aún más estos temas. Por último, estas obras de arte postdigital se debatirán con teorías extraídas de la educación contemporánea en artes visuales digitales, con el objetivo de que los educadores

artísticos puedan aprovechar las formas críticas de creación que representan estas creaciones artísticas.

Palabras clave:

Arte postdigital. Educación artística digital y visual. Arte glitch. Disfunción.

Resumo:

As obras de arte pós-digitais interrompem as narrativas utópicas de progresso e perfeição nas quais grande parte da arte digital se baseia. As obras de arte pós-digitais apresentam oportunidades socialmente relevantes e criticamente potentes para que os educadores de arte analisem essas narrativas, por meio de formas disfuncionais de criação que se baseiam simultaneamente no passado, no presente e no futuro. Este artigo analisará primeiramente exemplos históricos de arte visual que utilizam e abordam tecnologias em desenvolvimento, identificando temas utópicos e distópicos. Em seguida, o pós-digital será usado para analisar obras selecionadas de arte visual digital que expandem ainda mais esses temas. Por fim, esses trabalhos artísticos pós-digitais serão discutidos com teorias extraídas da educação contemporânea em artes visuais digitais, com o objetivo de permitir que os educadores artísticos se baseiem nas formas críticas de criação que esses trabalhos artísticos representam.

Palavras-chave:

Arte pós-digital. Educação em arte digital e visual. Glitch art. Disfunção.

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1. Introduction

> It has become evident in the development of contemporary art over the past few years that many artists are extensively involved with new materials and processes that have emerged through developments in science and technology (Klüver, 1969, p.4).

This statement, written by Billy Klüver in 1969, could easily apply to the relationship between art and technology in a variety of locations and eras. Throughout human history artists have relied upon the technologies of their time, using them to advance forms of expression and representation while simultaneously advancing those technologies through novel applications and combinations (Girão & Santos, 2019). If applied to our current era, this statement would undoubtedly refer to digital technology, and more specifically developments in Artificial Intelligence (AI). AI is one of the most discussed and debated topics in contemporary cultural conversations, as there seems to be few sociocultural areas that are not impacted. In the visual arts, AI poses a challenge to traditional notions of creativity (Small, 2023), the ethics of reproduction (Andersen, 2022), as well as legal concepts regarding copyright (Shapiro, 2023).

These are ideas that have been challenged consistently in the history of Western art through the 20th and into the 21st century. Many of the challenges posed by AI art are extensions of these previous periods, while others are unique to our time. Contemporary art and design educators are in a unique position to respond to these challenges through pedagogical approaches that acknowledge the work of contemporary digital media artists. In this article, I will explore the disruptions posed by AI based art as related to postdigital works of art in general, by looking at historical and current examples of technology/art hybrids. It is through these examples that a critique of technological progress will be suggested, which can be leveraged by art and design educators who are looking for creative and critical applications of digital technologies.

2. Histories of Technological Utopia

Artists who deal with developing technologies inevitably address the utopian themes inherent in the sociocultural narratives related to said technologies. Throughout the 20th century artists working in a variety of locations and through diverse media forms found ways to address and critique utopian themes of social progress and individual fulfillment. Many European art movements in the early 20th century sought to respond to the sociocultural power of developing technologies. The Italian Futurists, for example, were infatuated with the technologies of transportation and warfare, aligning with World War One-era Fascist movements while simultaneously looking to break from the traditions of the past that they saw as oppressive (Prezzolini, 1923). Where the Italian Futurists glorified the destruction of war, DADA, which was formed in Zurich Switzerland in 1915, chose to critique these destructive forces. As Hans Arp wrote: 'Revolted by the butchery of the 1914 World War, we in Zurich devoted ourselves to the arts. While the guns rumbled in the distance, we sang, painted, made collages and wrote poems with all our might'.

In South America, artists involved in mid-20th century Modernist movements such as Neoconcreto created works that responded to developing technological, social, and aesthetic structures. In his *Manifesto Neoconcreto*, art critic Feirrera Gullar wrote: 'We do not conceive of the work of art as a 'machine' or as an 'object,' but as a quasi-corpus' (1959). Neoconcreto artists such as the Brazilian artist Lygia Clark experimented with works that challenged formal traditions in painting and sculpture and used the body to challenge the proposed objective distance inherent in Modernism. Her proposições (propositions) series in the early 1960's incorporated performance art and what might now be called relational art, involving participants in the manipulation of simple materials such as thread, plastic sheets, and paper to create responses to increasingly technologically mediated social experiences.

In North America, The US-based art collective Experiments in Art and Technology (E.A.T.) brought technological approaches to artistic production, reception, and dissemination into conversations with fine art. They often paired engineers with artists to see what one group could learn from the other (Klüver, 1969). The opening quote from E.A.T. president Billy Klüver represents the general scope of the collective. However, the group was, more specifically, invested in the larger sociocultural benefits that such interactions could manifest. In *E.A.T. News*, published in 1967, Klüver and Vice-President Robert Rauschenberg wrote: 'E.A.T. is founded on the strong belief that an industrially sponsored, effective working relationship between artists and engineers will lead to new possibilities which will benefit society as a whole' (p. 1).

While E.A.T. were invested in identifying possibilities in art and technology that might benefit society, they also, intentionally or not, raised the issue that such relationships might result in dysfunction, and even destruction. Prior to the formation of E.A.T. in 1966, Billy Klüver assisted Swiss artist Jean Tinguely with his work titled *Homage to New York* (1960), which was to be installed in the garden of the Museum of Modern Art in Manhattan. Tinguely wanted to construct a machine that would self-destruct, and he enlisted Klüver to help him find sculptural materials such as bicycle wheels. Klüver also helped to rig the towering sculpture so that it would gradually collapse. As Folland (2020) writes:

> Tinguely is on the opposite end of [the] spectrum of anxiety around industrialization that runs throughout modern art. On the cusp of the 1960s, his art embraced the machine, if only as a symbol of the destructive nature of the modern world, or at least as an example

> of his, and our, disillusionment with Modernism's promise of utopia, a promise that seems only to recede (n.p.).

The dominance of these variations of Modernism have since waned, with Postmodernist concepts of plurality and cultural hybridity gaining influence in the late 20th century. For example, in the 21st century, authors, artists, designers, and musicians involved in Afrofuturism have explored themes of technology and utopia with a focus on culture and race. While Afrofuturism is often used to describe a wide variety of cultural forms that focus on the Black experience, critics such as Hope Wabuke have argued that the term, which was coined by a white scholar, views Blackness through a white gaze (Wabuke, 2020). Wabuke offers the term Africanfuturism to denote ways of making that are deeply rooted in African culture, history, and mythology. Wangechi Mutu is a Kenyan American artist whose work addresses intersections between technology and a variety of lifeforms through an African feminist lens: 'The visionary hybrids populating Mutu's work usher in a world where diverse species and peoples exist in a harmony rooted in interconnectedness' (Tylcz, 2023, n.p.).

The art movements described here each add a layer to our potential understanding of the intersections between art and technology as viewed through the lens of utopia and dystopia. The Futurists saw the potential for art to merge with a daily life that was increasingly dependent upon technology, although their ideologies problematically aligned with Fascist movements of the early-20th century. DADA artists saw the potential for art and technology to critique such Fascist politics, responding to the destruction brought about by WWI through decidedly absurd gestures. Neoconcreto artists such as Lygia Clark saw the potential for art to speak to interactions between technological progress, human interaction and psychological wellbeing, while E.A.T. brought together artists and engineers, with results that were often creative as well as destructive. And contemporary Africanfuturists artists such as Wangchei Mutu bring together many of these themes, offering hybrid visual experiences can provide hope for those living in technologically advanced times. In each example, complex narratives of sociocultural progress and dysfunction are interwoven. These narratives of utopian optimism and interconnectedness, and dystopian absurdity and dysfunction point towards postdigital opportunities for artists and art educators.

3. Postdigital Art

The intersections between art and technology described previously have helped to create what digital media theorists are calling the postdigital. The initial explorations of postdigital concepts in the arts were rooted in electronic music and were intended to disrupt narratives of audio perfection and clarity that were part of these discussions in the late 20th century (Cramer, 2015). At the turn of the 21st century glitch-based works by Kim Cascone (2000) took digital tools that were presented as being free from distortion and noise, and integrated audio elements that were often jarring. These glitch pieces represented approaches to making art that could simultaneously look to the past and the future, and in this hybrid that the postdigital is situated.

In the visual arts, the postdigital refers to works in which the digital is used as yet another medium, to be used, skewed, and potentially abused in for a variety of results:

> Emerging from a framework in which technology is naturalized, a post-digital aesthetic would be one in which the artist, through his or her creations, provokes a tension that makes visible the interpenetration of digital technology in every layer of our lives. We

> could say it coexists with the digital and even the pre-digital, but it involves a critical attitude regarding the notion of digital progress, questioning the positivist ideology that assumes technological development as a linear progress: inevitable, neutral and, ultimately, beneficial (Goicoechea de Jorge, 2022, n.p.).

In this manner, postdigital artists can be seen as related to the artists discussed previously; in particular, artists involved with DADA and E.A.T. critiqued this notion of progress through absurdist gestures and destructive experiences.

Jennifer Chan is a contemporary artist who uses a diverse set of postdigital practices, approaches, and theories. Her works range from web-based video to gallery installation, resulting in a decentralized, postdigital combination of media forms. For example, the sculptural work *Ally (Nice White Person)* from 2018 is composed of a Moomin stuffed toy sitting on an IKEA stool, its back facing the viewer as the enter the space. The work has been altered as such; the plush toy wears a bracelet that reads 'GOOD CSS' with a miniature cellphone dangling from the bracelet. Across the back of the toy reads 'RESPECT' embroidered in varsity font. On the front chest of the Moomin is an embroidered white ribbon. Here, the modified plush Moomin figure channels references to race, computer code, and violence against women in an absurdist manner, in that the markers of childhood (toys, charm bracelet) are brought into conversation with serious social and cultural issues. These references can also be found in her earlier digital video pieces and thus create a network of absurdist digital and postdigital references and experiences.

Petra Cortright channels similar layered ways of working in her artwork, which includes digital video, still digital images, and paintings that blend and blur the digital with the analog. Her works reference various traditions in landscape painting, but the layering of digital prints and projections with various materials such as vinyl, canvas, aluminum and paper create results that only reference landscape in a deconstructed and perhaps violent abstract form. As she states:

> The abstraction in my work comes from using really bad quality images. I don't feel bad about ripping shitty things apart. If it is really high definition with beautiful details it feels more precious. Why abstract that? I want to cut up things that aren't working on their own (Herriman, 2017, n.p.).

Although these postdigital works by Chan and Cortright are quite different, they share the quality of being intentionally crude and unfinished, at least when compared with gallery-based visual art in general. In this manner these works relate to the glitch pieces made by Cascone (2000). Postdigital works of visual art can be perhaps better understood through the concept of the 'poor image'. Poor images as theorized by Stereyl (2009) are the degraded copies of digital commercialism and capital. They represent a critique of these ideologies while they also open possibilities for new forms of participation:

> The networks in which poor images circulate … constitute both a platform for a fragile new common interest and a battleground for commercial and national agendas. They contain experimental and artistic material, but also incredible amounts of porn and paranoia. While the territory of poor images allows access to excluded imagery, it is also permeated by the most advanced commodification techniques. While it enables the users' active participation in the creation and distribution of content, it also drafts them into production. Users become the editors, critics, translators, and (co-)authors of poor images (n.p.).

As this quote states, poor images are forms of critique that are also tied to the systems that they critique. Postdigital works of art operate in a similar manner. Through flawed forms of reproduction and dissemination, postdigital works of art critique utopian narratives central to digital technologies while using the very technologies being critiqued.

Although a relatively new field, AI art will eventually become commonplace to the point where it will be just another type of digital art; at that point, the cultural fascination with AI art will fade, just as it has with net.art which is now a part of post-internet practices. I will now turn to a discussion of AI art, in order to explore the possibility that postdigital concepts as informed by the 'poor image' might serve a similar critical function within this emerging field of visual representation.

4. AI Art and Postdigital Theory

As stated in my introduction, AI art challenges previous concepts of creativity, reproduction, and copyright. Almost every day, a news headline frames AI as the epitome of scientific progress, or points to the ways that it is far from perfect. They present the novel forms of interaction present in AI technologies, either warning about the social and environmental dangers inherent in such interactions (UN Environment Programme, 2024), or proclaiming that a utopian future is within reach, to be found in the interconnectedness of such vast computing systems (Khosla, 2024).

AI is already having an impact on numerous fields within the visual arts. Some already use advanced digital technologies, such as CGI in the motion picture industry, while others rely upon more traditional media, such as hand rendered comics. The 2023 SAG-AFTRA strike was, in no small part, focused on the use of AI in writing screenplays and digitally replicating actors in film and television (Dalton, 2023).

One AI related storyline that is relevant to this discussion is the case of Matthew Allen, who won first place in the Colorado State Fair in 2022 using an image that was generated through the AI image generator Midjourney. Soon after this award was received, The US Copyright office ruled that Allen could not hold copyright of the image because the automated nature of the process was central to the production of the work (Knibbs, 2023). The initial validation of the work and the subsequent legal ruling speak to issues of originality and creativity that are germane to art educational practice, as well as the utopian and dystopian themes that were discussed previously in this article.

Image generative AI platforms harness the capabilities of large-scale computing networks and databases in order to allow for the rapid generation of images from text prompts:

> A.I. text-to-image generators such as Stable Diffusion, Midjourney and DALL-E … have become widely used to create all sorts of images, ranging from digital art pieces to character designs. Stable Diffusion alone has more than 10 million daily users. These A.I. products are built on collections of images known as 'data sets' from which a detailed map of the data set's contents, the 'model' is formed by finding the connections among images and between images and words. Images and text are linked in the data set, so the model learns how to associate words with images. It can then make a new image based on the words you type in (Anderson, 2019).

Contemporary digital artists are currently exploring AI-based programs which allow them to make use of vast amounts of digital information, potentially shifting cultural notions of creativity and originality in the process. While artists such as Matthew Allen are using commercially available text-to-image generators, others are working with computer programmers to customize the process and the product. In 2023, painter David Salle worked with a team of computer programmers to attempt to design an AI system that could, in his words, 'create good art.' To do this, he generated numerous images based on a single prompt and then critiqued them as he might one of his students (Small, 2023).

While Allen and Salle use AI to generate finished works, there are artists who are more concerned with the biases that are embedded in the code itself. Artists such as Dennis Delgado use AI programs to critically examine the sociocultural implications of AI use in facial recognition software. As Delgado (n.d.) states:

> Current studies show that facial recognition systems are less able to detect a face in an image when the skin tone of that face is not Caucasian. The undetected faces are then not enrolled in the systems' database. As a result, many of the systems are trained using datasets which contain fewer people of color, making those same systems inaccurate when recognizing or identifying individuals of color. The Dark Database is a kind of record of visibility and representation as seen through the eyes of artificial intelligence (n.p.).

In *The Dark Database* series, Delgado identifies the racist underpinnings of facial recognition software using the open-source program Open Computer Vision. He uses these programs to reflect these inherent biases back to the viewer. The resulting composite portraits for films such as *Get Out* and *Training Day* are records of visibility and invisibility, with the faces of actors with lighter skin tones being included and those with darker skin tones being excluded. These blurred self-portraits might be considered in the same category as the postdigital glitch landscapes of Petra Cortright, in that they make use of complicated processes and numerous layers of visual imagery. However, an important distinction is that the social commentary that is central to Delgado's *Dark Database* is not found in the intent of Cortright.

The comic artist Sarah Andersen has raised important issues about the impact of AI image generation software on her own work, her artistic identity, and artistic production in general. in the opinion piece titled *The Alt-Right Manipulated My Comic. Then A.I. Claimed It* (2022), Andersen describes the process by which her webcomic was initially appropriated by individuals from the alt-right. These appropriations used comic images that she had created and paired them with text that aligned with alt-right ideologies such as Holocaust denial. She describes this as a violation of not only her artistic rights, but her personal beliefs and political affiliations. She then details the process by which AI text-to-image generators were able to appropriate her comics, reproducing the visual appearance but not the content. This, she fears, is a violation that is far worse than the appropriations by the far right. AI generators such as Stable Diffusion are based on data sets that are accessible by the public. These data sets include a great deal of pornographic and violent content, so the intentional appropriations of her work by the alt-right could be pushed even further and could be carried out by individuals who have no sense of the violations being carried out.

The malleability of digital images and processes can be seen as both beneficial and harmful. The work of Jennifer Chan described earlier provides a visualization for the seemingly random connections that can be made in postdigital approaches to making art. These absurdist gestures are also found in AI image generation, specifically when the

results are not what was anticipated. However, the process by which these absurd images are made are quite problematic, as they conceal violations to the individual authority of the artist and include references that might diametrically oppose their beliefs and viewpoints.

As AI continues to expand its cultural reach, becoming more powerful and robust, it will certainly be used by an increasing number of artists, many of whom will explore postdigital strategies of dysfunction and absurdism. Artists such as David Salle and Matthew Allen who explore narratives of utopian optimism in AI art will undoubtedly be met by those who address dystopian dysfunction as seen in the work of Dennis Delgado and absurdist applications such as those addressed by Sarah Andersen (2022). It is through these varied gestures that we can identify postdigital opportunities for artists and art educators.

5. Art Education and Postdigital Dysfunction

Art and design educators have surely been watching developments in AI image generation with a great deal of interest. For every art educator who is excited about the possibilities for AI in art educational practice, there are potentially an equal amount who are quite skeptical. And then there are those who are waiting for this moment to pass, like those that have come before. Prior to the AI fervor, there were non-fungible tokens (NFT's) that had attracted the attention of artists, cultural critics, and investors alike. Before that, it was the metaverse, preceded by VR, and before that it was videogames, and so on. Each of these digital products is unique, but one quality is shared by all: they all have been targeted by venture capitalists as the next big thing, representing the promise of a utopian future.

Art and design education researchers have generally been cautious about the pedagogical potential of AI. In design education, discussions of AI have tended to take the form of instructional support. Tang et al., (2022) describe the application of AI in the teaching of animation design strategies. Anderson (2019) outlines the ways that design schools are implementing AI and machine learning, both in how these systems are designed and how they might be implemented in educational settings. In both examples, AI can be seen as an extension of computer-assisted pedagogies that have their roots in Behaviorism. And while B.F. Skinner did not directly connect operant conditioning to digital technologies, these ideologies nonetheless have influenced the social implementation and understanding of contemporary digital technologies as a whole (Franks, 2024).

Art educational researchers have provided unique perspectives on AI. Chen, et al., (2023) describe the potential for AI-based image generation that could combine Thangka painting styles in a manner that is experimental and culturally relevant. Zhao et al., (2024) present data related to the teaching of art appreciation, and how AI-based analysis can improve the efficiency of instruction. Both of these studies tend to approach AI in an optimistic light, with little discussion of the potential negative impact of AI in either image generation or art instruction. Taking a skeptical stance, Slotte Dufva (2023) argues that theories drawn from technological feminism can allow for the critical evaluation of AI art. He looks to digital visual artists such as Hito Stereyl who subvert the power of computational processes found in AI, proposing a complementary notion of 'Artificial Stupidity' (p. 187). And Pente et al., (2023) look at the ethical implications of using AI in educational settings, citing a variety of studies that outline the possibilities

as well as limitations of such use in preK-12 school settings from a variety of cultures and locations.

Pente et al., (2023) use a posthumanist framework as they analyze these aspects of AI-based art. Here, posthumanism acts as a necessary corrective to descriptions of human-technology interaction that center the human and disregard or downplay the nonhuman extending at least as far back as *Skinner's Teaching Machines* (Watters, 2021). In *Skinner's Teaching Machines*, the use of the technology of the time was seen as a means to an end; this end was a prescribed concept of what was to be learned, and the optimization of this cybernetic process was the primary concern. In posthumanism, the technology is an active participant as the creative process becomes distributed across a variety of human and non-human actors. Skinner argued that creativity was a 'behavioral mutation' that all could potentially express, with the process based on random chance (Abra, 1988). Here we see a meaningful connection between AI and creativity. Approaches to making art that foreground random chance can be found in the work of many of the artists discussed previously; specifically, DADA, Lygia Clark, E.A.T., and Petra Cortright. Art educators may find opportunities to explore posthumanist concepts as they relate to such artistic strategies, making connections between historical art movements and contemporary AI image making.

6. Conclusion

Art and design educators who are interested in addressing AI image making and related issues of originality and creativity would be well-advised to look at the concepts drawn from artistic practices in this article: utopian interconnectedness, dystopian dysfunction, and postdigital art and the poor image. In addition, theories from art educational research informed by technological feminism and posthumanism can help to inform future postdigital pedagogical practices.

First, utopian views on the relationship between art and technology should be addressed by postdigital art and design educators. The history of the Futurists and contemporary works in Africanfuturism by artists such as Wangechi Mutu speak to the impulse to embrace the potential for technological progress, even as they address problems with unchecked political power and colonialism. Second, artist collectives such as DADA, neoconcreto, and E.A.T. foreground the dystopian potential in technological advancement provide postdigital art and design educators with relevant critical strategies based in dysfunction and absurdism. Third, postdigital artists advance these dysfunctional, absurdist gestures; sound works by Kim Cascone and visual art by Jennifer Chan and Petra Cortright highlight the ways that digital technologies fail, and the ways that these types of poor images can be viewed as critiques of the technologies being used.

Postdigital art and design educators should also acknowledge the potential for technological feminism and posthumanist theories. In order to better situate these theories, the historical influence of Behaviorism on contemporary educational theory and practice should be referenced. These simplified diagrams of technological interaction are of little relevance in art educational settings that are complex intersections of history, culture, biology, and technology. Postdigital art and design educators should move beyond simplistic notions drawn from Behaviorism such as cause and effect and should instead embrace the complexities represented in posthumanist educational theories.

As a subset of posthumanist thought, new materialism can provide postdigital art and design educators with a framework through which intra-actions between human, machine, code, and image might be analyzed. Coole and Frost (2010) offer the following framework for new materialist scholarship that consists of three themes:

First among them is an ontological reorientation that is resonant with, and to some extent informed by, developments in natural science: an orientation that is posthumanist in the sense that it conceives of matter itself as lively or as exhibiting agency. The second theme entails consideration of a raft of biopolitical and bioethical issues concerning the status of life and of the human. Third, new materialist scholarship testifies to a critical and nondogmatic reengagement with political economy, where the nature of, and relationship between, the material details of everyday life and broader geopolitical and socioeconomic structures is being explored afresh.

Art educators Garnet & Sinner (2019) argue similar points related to the telling of stories in educational contexts. In a new materialist framework, the fact that a human is collaborating with powerful databases and coding languages would not be seen as a form of dehumanization. In this manner, new materialism can be seen as correlative to the Actor-Network Theory of Latour (1996). The collaboration between machine systems, code, and humans actants creates a network of interactions that are to be acknowledged without the judgment that accompanies humanist notions of individuality or creativity. New materialist pedagogies have been embraced by some and feared by others. How might art and design educators react to these responses? If art and design educators were to situate the complexities of AI and postdigital art within art historical and cultural practices, then might the apprehension created by these artforms be dissipated?

As I have discussed, much of the apprehension towards AI and postdigital media can be found in the challenges that they pose to notions of creativity and originality. In art educational practice, there has been great historical value placed upon creative self-expression. Wilson and Wilson (1977) had undertaken the process of exploring and potentially demystifying Lowenfeldian creative self-expression in the 1970's when they described the act of drawing through the extended metaphor of the *drawing-an-object program*:

> As far as a program for drawing is concerned, one could think of the mind as a programmer for the computer/brain… The programmer dimension of mind is the source of signals containing generalized notions regarding the way in which drawings ought to look. When a signal is sent from the programmer to the computer brain that a particular object is to be drawn, a hierarchically ordered set of functions is set into motion. As the hand-held tool begins to mark on a surface, the sensory receptor experiences a flow of energy or intensity as well as sensation or the quality of intensity. The configuration (of the object to be drawn) is remembered (p. 7).

Here, the language of cybernetics is employed in the service of the description of the process of drawing; specifically, it is the repeated act of drawing that recalls previous iterations and makes adjustments or causes the mind to terminate the process out of boredom or frustration. The Wilsons use the concept of the drawing program to describe the vast repertoire of sign systems available to the user. These exist alongside one another, which runs counter to the stage theory of Lowenfeld.

It is necessary to compare this theory of artmaking to the ways that AI-generated art is currently being discussed. As discussed earlier, David Salle recently worked with a team of programmers to attempt to design an AI system that could, in his words, 'create good art'. To do this, he generated numerous images based on a single prompt and then critiqued them as he might one of his students. Here, the programmer is working with

the AI program, and not the 'hand held tool' described by the Wilsons. The distinction is important. However, if we look at this distinction through a new materialist lens, we can see less of a distinction than perhaps previously thought. The prompt creates the AI work, just as the programmer creates the mark. The materials are different, but the process is similar.

AI-based artmaking will only continue to expand as computing power increases and networked image databases expand. While these programs are technologically intriguing and artistically fascinating, they also bring about a number of challenges related to the ethics of copyright and fair use. These are issues that will certainly be relevant to art educators, designers, and media scholars as the 21st century progresses. As the work of Anderson (2019) indicates, educators, artists and theorists will need to push back against the technodeterministic forces that pursue and fund projects such as these. By taking a technological feminist stance (Slotte Dufva, 2023) that is both new materialist and posthumanist, the challenges of AI art can be identified and scrutinized.

A postdigital art education must acknowledge the perplexing and problematic aspects of advanced technologies such as AI. The notion of the postdigital challenges the relentless drive toward the new in digital media, by fusing traditional media with that which is currently being developed. The socio-critical theories known as Feminist New Materialism complicate previous notions of agency and anthropocentrism that are the bedrock of Western humanist epistemologies. Feminist New Materialism looks at these concepts and introduces a healthy skepticism that can help art and design educators who are navigating new technological terrains.

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