Chapter

The Creative Surrogate

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Abstract

It is not just manufacturing jobs that are being replaced by digital automation: creative careers now face this specter. As generative techniques advance, both for images and text, the application of expert systems will not stop at replacing mundane tasks. Instead "smart" software is making incursions into intellectual fields as diverse as art, design, photography, and authorship. Systematized applications of artificial intelligence are beginning to play new roles in the creative process. Intellectual surrogates are becoming a new front in the centuries-long cultural transformation brought about by technical innovation and automation. Production trends in digital culture suggest that we will be treated, increasingly, to "automagical" software authorship and artistry. If past is prolog, the degree of intellectual dependence on software will be a guarded secret. Human input into creative products may begin to resemble the fruit content of packaged juices, as for example "Contains 2% human input." The time has come to evaluate the likely consequences of the systematized generation of (formerly) creative products.

Keywords: creativity, artificial intelligence, innovation, art, automation

1. Introduction

Until recently cautionary treatments of machine intelligence were representations of the possible. In the late 1960s, Stanley Kubrick's disobedient space station assistant HAL 9000 reflected popular distrust of new computing technology. But it was just a story. After decades of hardware and software engineering and the emergence of ubiquitous computing and personal digital assistants like Siri and Alexa, the assessment of artificial intelligence has shifted from an imaginative thought problem into the realm of day-to-day experience. In short, AI has left the realm of science fiction and become a part of our daily lives.

Since most of us are not decision-makers at Apple or Google, the creep of machine learning into our daily lives has an air of inevitability: It is simply a part of new phones and other devices that we buy. Software keyboards, for example, now use algorithms that mine our personal data to guess what we are trying to type with our fingers. From grammar correction to "suggested reply" buttons in email software (reply: "Thanks!" or "Got it!"), the promotion of normative expression is well upon us. Had a Dadaist like Tristan Tzara written his absurd and irrational poetry in today's word processing tools, his creative process would have become a fight against auto-correction. Of course there are still "dumb" typewriters available in thrift shops, and for many the convenience of these corrections outweighs other considerations. But it is not too

soon to reflect upon the ways that machine learning is changing both habits of mind and modes of expression, especially as it relates to the arts.

1.1 Shortcuts in academic writing

Not long ago, I lectured in a graduate program in fine art that had many foreign exchange students who spoke English as a second language. Around 2018 the poorly written essays turned in by numerous students seemed unlike any I had received in the past. After considerable research, it became apparent that the papers were a byproduct of automated translation. The translated source texts were not attributed, making this misrepresentation a form of plagiarism. Although software detection tools exist to flag plagiarism, those tools typically declare texts to be free of plagiarism if they are first translated into another language and then back into English. While plagiarism is nothing new, the ease with which words can be acquired and "processed" to meet assigned criteria is striking. What is more, these problems were just the tip of the proverbial iceberg.

In 2021, it was reported that a senior software engineer at Google was put on leave for having the audacity to maintain that a software research tool (Language Model for Dialog Applications) being developed at Google had crossed over into the realm of sentience [1]. An article on the current state of A.I. text generation by Steven B. Johnson, published in the New York Times [2], confirmed that the latest capabilities for synthetic text generation are mind boggling. Johnson related how a person need only type one sentence and a generative text system can produce pages of text that feel like they belong to the same topic and style. This startling shift in word processing technology will have a momentous impact on academic practices. Students now have access to generative tools like OpenAI's ChatGPT, and academia is beginning to take note of it [3]. With the emergence of this technology, every paper read by a professor resembles a Turing Test. Is it an essay written by a student or is it a synthetic conglomeration of words and sentences chosen according to a complex probabilistic algorithm? If the degrees conferred by universities and colleges are to signify that students have engaged in research, reflection, and critical thinking, the methods of assessment will have to keep pace with generative text technology that can spit out topical essays on demand.

In a cautionary column assessing the merits of using AI for writing, author and columnist Mitch Albom "asked" ChatGPT why a student should NOT use it to write papers. Albom's critique of the reply was that it left out joy and satisfaction. "There is a joy in taking the language you have learned and reassembling it to create your thoughts....There is satisfaction when you read over something you have created from scratch, something that only exists because you made it exist, something that took the impulse in your brain's gray matter and sent it through your fingers and onto the page, where your eyes can read it and your heart can appreciate it" [4]. While Albom's point of view is reasonable, the proliferation of fascinating interactive AI spectacles leaves little doubt that joy and satisfaction can be generated in ways that do not qualify as "from scratch" creativity.

Looked at from the perspective of the budding writer, this new ability to produce pages of coherent text based on one sentence is rather seductive. In many creative disciplines, it is not uncommon to seek ideas from reference material as an aid to production. For example, many designers peruse color palettes, often made by others, in an effort to choose exactly the right colors for a design project. An argument can be made that having a software writing partner that suggests possible sentences (to

follow the current sentence) is little more than a source of inspiration, like a book of color palettes. But if the majority of writers draw inspiration from text generative systems, what would be the cultural impact?

Since the essence of a machine learning system is the digestion and regurgitation of a training set, they are fundamentally imitative. Admittedly, much of what passes as human "creativity" is often highly imitative, too. Still, the use of writing prompts is a problematic turn for the practice of writing. It would appear to tip the scales in favor of writing products that are similar, corrected, and normative. Also, it contributes to a kind of intellectual laziness. Instead of thinking through which sentence, idea or argument, should come next, the writer is encouraged to treat writing as a kind of multiple-choice activity. It is certainly a kind of writing, but it represents a new habit of mind that's reliant upon software.

How does this compare to the use of navigation systems? Before global positioning system (GPS) navigation became common, people internalized more of the knowledge required to get from point A to point B. They used maps and asked local residents for help, but the process involved cultivating memory to make the process smoother the second and third time around. With reliance on navigation systems, the impetus to learn the route is diminished. One can simply turn on the navigation system each time. It is easy and efficient. Navigation systems are able to incorporate current traffic conditions in ways that were not possible in the past. Ultimately people will disagree about the best way to navigate, and there are reasonable arguments to be made for older ways and newer approaches. Citing anthropological research and the philosophy of Albert Borgmann, Jeff Robbins argues in his analysis of GPS that "our addiction to the power of technical order [renders] us increasingly helpless without our conveniences" [5]. Could the same be said for using machine learning as a creative prompt for writing?

It has been suggested by Aeschylus that memory is the mother of all wisdom. Does an intellectual surrogate like ChatGPT apply the right sort of memory to evoke the insight of wisdom? Isn't there an important difference between the data model of cloud computing and the human mind? Profound human experiences like loss, betrayal, and love can impact how a person thinks, what she remembers, and what feels valuable. But machines do not have those kinds of experiences or feelings. Nor do they experience mortality, urgency, regret, and so on. In short, human experiences and emotions are unavailable to a machine algorithm that is optimized to predict the next sentence based on the previous sentences and a database of models.

This is not to say that machine learning should be banished from the domain of writing. Software grammar correction tools—and suggested reply email buttons—can help to teach a language. There is intriguing potential in learning to write with expert systems that can convey which vocabulary and grammatical structures are most commonly deployed in a given form of written discourse. The point at which this process of guided writing becomes problematic is when the writer begins to rely upon it to generate ideas and to inform the thoughts that they are expressing.

When the academic intent is to expand student understanding, plagiarism—no matter how technological—typically grounds for expulsion. Institutions of higher learning do not exist simply to generate text, they are also founded upon ethical and idealistic principles about education. But it is not hard to see that the use of technology to game the academic system—to circumvent rules—is the kind of corner-cutting tactic that brings success in other contexts. In social media, like Twitter, a misrepresentation akin to plagiarism has already proven to be effective in influencing people: bots and bot farms inject content into social media using fake accounts and automated

scripting. The practice has afforded some people an outsized influence in promoting messages, candidates, and ideological agendas. Arguably this kind of strategic messaging is a bit like false-flag public service advertising: corporations masquerading as benign-sounding trade organizations to promote their own interests.

Another kind of fraud also excites influence: so-called deep fake technology makes it surprisingly easy to produce photorealistic videos that simulate events and actions that never took place. Although it undermines the truism that seeing is believing, ultimately the deep fake is simply a new tool in the expressive arsenal of video producers. That deep fake products are often a hot commodity in the meme culture of social media shows how the application of advanced technology can be both rewarding and ethically problematic. These memes can be a form of slander and an instrument of propaganda. But some bleed over into the domain of parody and prank, as well. Used with a parodic intent, the deep fake is not that different from a prank by celebrated artists like the Yes Men.

If there is a potential for new tools and digital practices to generate buzz, followers, and media attention, their eventual use is assured regardless of ethical complications. Contemporary media culture has created an appetite for visual novelties and innovation. Whether newly minted tactical media strategies are clever or corrupt may simply depend upon the context. Each institution, it seems-whether it be a media corporation, an educational institution, or an art competition-must establish its own set of rules about what sorts of deceptions are permissible.

1.2 Template-driven visual culture

Demand for visual innovation has not been a historical constant. Visual practices in many cultures have been founded upon the ability to reproduce the representational qualities of a master or of a regional style of painting. Though they are often beautiful, these kinds of visual orthodoxy tend to constrain creative practices. Works by one artisan can look strikingly like those of another. The visual modes in such cultural traditions resemble a kind of decoration that reflects an assortment of models.

The approach is reminiscent of the template-driven qualities that dominate contemporary web design, in which authors are offered minor variations on a set of pre-built templates. There is a practical side to this, since web design encompasses complexities of software engineering today. For years artists and designers have experimented with web design and struggled with it. The design process has changed as a result of the growing complexity of building websites that meet usability goals as well as visual design goals. The field of user experience design and user interface design (UX/UI) is largely an outgrowth of the demand for elegant solutions to complex interactive design challenges. It has been a growing sector of design for decades.

Today, however, one can generate Web site imagery and mockups of branding designs by summoning them forth from an AI image generation system (**Figure 1**). One need only describe images with a few words to obtain something usable. This easy emulation of design, illustration, lighting, and photography portends some radical changes of working processes in design. Moreover, as visual design merges with software engineering, there is an opening for systematization and machine learning to usurp a surprisingly large amount of the visual designer's work. In a scenario anticipated by Steven P. Anderson in his address at South By South West (SXSW) in 2019, feedback can be applied to interactive designs through a process known as "A/B testing" [6]. In essence, Web site visitors are presented with subtly different versions of the Web site. User response times and click-through rates can be observed

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Figure 1.
Example AI generated designs 'created' by the author.

and designs can be optimized to establish the best fonts, colors, text sizes, and so on, until the results are as good as it gets. For decades the notion that machines and new technology would supplant a lot of arduous physical labor has been a commonplace assumption. Now, however, the specter of automating more conceptual professions like interactive design demands consideration of whether it is desirable to relinquish to machine "intelligence" the very activities that define the expressive qualities of our visual culture.

1.3 Controversy surrounding generative imagery

In 2022, a state-wide art competition in Colorado awarded its first prize to an image that judges undoubtedly had assumed to be produced in a traditional, painterly manner. Despite an oblique clue appended as part of the entrant's name, they were unprepared for the possibility that the image had in fact been generated using algorithms that applied machine learning and deep convolutional neural networks. In short, the contestant, Jason M. Allen, fed a series of textual descriptions into the Midjourney software package until it spat out the prize-winning image. The products of that process are both familiar and unanticipated due to the ways that the content and visual style are reflected through the matrix of other images that have been used to train the system. Not surprisingly, artists who had used more traditional means for their submissions to the contest were suitably miffed by the decision. In fairness to the judges, the image that they chose adhered to principles of composition, balance, and color that traditionally have only been applied by knowledgeable artists who are familiar with painting and art history. The controversial selection raises a salient question: why should the contestant be punished for using artificial intelligence to generate an image if judges felt it was the best?

There are a variety of potential responses. For one, the winning image was comprised only of colored pixels. Unlike many of the other submissions, there was no

physical artifact. Yet there is no reason that, eventually, machines could not reproduce the physical textures and qualities of paintings, too, using similar machine learning techniques to establish the most desirable properties of famous canvases. Would it have been more acceptable if the winning contestant had used paints and brushes to copy the image he generated procedurally onto a canvas? It is tricky to defend traditional image-making approaches on the basis of the visual difference of the products themselves because it is impossible to anticipate the myriad correlations that "AI art" could involve, or the training sets of images that comparable software systems could be provided. Is the real problem, as with plagiarism and academic integrity, that the AI artist just cut too many corners?

It is quite common in art schools for students to copy great paintings and to make sketches from paintings. Practices that resemble forgery are permitted in the academic context as a way to understand great works in more detail. The point of these exercises is not to train people in the art of forgery. It is to comprehend the process and content of revered paintings so that the knowledge acquired can later be applied to new works. In this model of art training, which sometimes also involves apprenticeship, the trainee must understand the canon and learn to reproduce its qualities before departing on a more independent path. While these rites of passage have not been universal, they have been a very common pattern of training in the arts of the last few centuries. The sudden emergence of an image-making practice that involves calling forth images, with a few clicks of a mouse, flies in the face of this tradition, which is a tradition of both painting and knowledge transmission. In some ways it resembles the challenge to painting that was posed by the Daguerrotype, about which the painter Paul Delaroche pronounced, in 1840, "from this day, painting is dead."

But in truth the challenge to traditional painting posed by software has been arriving for a long time. In 1988 Timothy Binkley wrote:

> *One hallmark of interactivity with an "intelligent" machine is the ability to discourse in generalities and dispense with the need to delineate all the specifics: we can tell the computer to adjust properties of objects or images without delineating each and every detail as a painter must in manipulating pigment. Since the computer understands concepts, we can tell it to make the mountains rougher without saying exactly how it is to be done. This makes it possible for the artist to work at a higher level of generality [7].*

What is astonishing about a tool like Midjourney is the way that it functions with only the most general instructions from its human operator. It removes the practice of image-making from the realm of labor and expertise. This break is centuries in the making. The Western tradition of painting has long cultivated a mystique about the genius of the artist who was able to translate a rich imagination into paintings and sculptures. With the emergence of perspective in the Renaissance, artists worked increasingly in styles that reflected a cohesive point of view, as if the artist's eye were a camera. As David Hockney argued in his BBC series Secret Knowledge [8], the artistic application of imaging technologies like concave mirrors, lenses, the Camera Lucida, and the Camera Obscura contributed to the transformation of European painting styles. Representational practices that were extremely difficult to achieve with the unaided eye became common. In his assessment, the use of optical imaging technology began to spread beginning in the fourteenth century, even though their use remained a guarded secret. The secrecy not only conveyed a competitive advantage vis-a-vis other artists, it also sustained impressions of

artistic genius and skill. In effect the imaging tools permitted artists to focus their attention differently. They were able to work "at a higher level of generality" by tracing the contours of a scene from a projection rather than having to precisely observe every detail of position and proportion. Since art historians have largely neglected the implications of Hockney's work, many young artists who encounter secret knowledge for the first time are surprised to learn that imaging technologies have been around for centuries.

Even today many artists keep their digital cooking a secret. Computer imaging technologies have quietly pervaded contemporary art to the point where it is uncommon when artistic practices do not involve the computer in some way. In this context, it does not really make sense to ask whether artists and art competitions should be required to use only traditional media and techniques. Instead the problem is how to address certain technologies that seem to break too radically with conventional practice, and how to respond to the dissatisfaction with the encroachment of new modes of generative imaging based on machine learning.

In 2022, a French game developer known by the name "5you" created an artificial intelligence (AI) tool for people to generate manga without artistic skill. Suddenly people with no illustration talent could generate manga that looked professional. This use of AI to simplify the generation of anime and manga, in the style of the artist Kim Jung Gi, sparked a furious backlash from Japan's anime community. 5you reported that he received death threats from Jung Gi loyalists and illustrators who resented this appropriation of the recently deceased artist's work. According to 5you, the reaction also reflects a kind of panic among the artists and illustrators. "I think they fear that they're training for something they won't ever be able to live off because they're going to be replaced by AI" [9].

Like photography, which made obsolete the practice of hand-painting slides for projection, this automagical production process does threaten to disrupt career paths. The replacement of skills with software systems brings the specter of technologically-driven unemployment to a whole new class of professions, ones that until recently seemed safe from the tumult of automation. From expendable illustrators and artists to outmoded fashion models, who are being supplanted by evergreen virtual avatars (like Lil Miquel with over 2 million followers), the visual culture is evolving in some unanticipated ways.

Although in the current state of AI art, controlling the results remains somewhat crude, the public's fascination with visual effects and simple "creative" practices insures that these kinds of image generation are not going away. Already there are countless apps for mobile media, that permit people to see themselves as a cartoon, make themselves bug-eyed, or wear cartoon animal masks that adapt to their facial expressions.

These visual effects unlock new dimensions of digital media as a performative context. From "machinema" to the "deep fake" technologies, the world of computing is becoming a playground filled with low-hanging fruit techniques of image manipulation, filtering, and enhancement. With social media as a venue for these types of spectacles, the need for "art competitions" and the imprimatur of artistic exhibition are in many ways becoming unnecessary.

Nevertheless, mobile phone camera effects software makes photos produced by different users all start to look the same. When users are presented with limited style options this is inevitable. Such canned effects now appear uncritically in admissions portfolios for art schools. In many respects the style of these photos belongs more to the "app"than to the artists. They are baked into the software systems in a way.

Of course if the only criterion that matters is whether the student photographer experienced joy while making the images, then the glib application of styles is no mistake, just a happy accident. Assuredly the makers of simplistic software tools would like people to adopt this point of view. The marketing of software tools routinely exaggerates the usefulness of such products. What is more it attempts to fool consumers into believing that they will become creative simply by buying the product. Such marketing is hardly new, but with the popularization of easy media production tools, the *zeitgeist* of self-centered and intoxicated pseudo-creativity has been taken to new levels.

1.4 Ideal creativity

In the classical Greece of Plato, painters were not even thought to be creative. Their work was imitative rather than intellectual. Through the Middle Ages in Europe, creativity was God's work. Even centuries after the Renaissance the term "creativity" seemed a bit too proud for Christiandom, where the term evoked the Latin notion of creation "*ex nihilo*" (from nothing). By the nineteenth century the idea of art as human creativity became more commonplace.

Even so, in the mid-nineteenth century, when Henry Fox Talbot titled his book of innovative new (photographic) calotype prints, he chose *Pencil of Nature*. Like other early inventors of photography, Fox Talbot saw himself more as mid-wife to the creative process, revealing the images that nature had generated on his treated paper. Today marketing rhetoric for popular software has departed from this modesty. If we are to believe the software industry hype, it takes no effort for anyone to generate results so astounding that it is unclear which is more impressive, the new technology or our casual mastery of it. In this new world, illuminated by the glow of marketing, there is no cause to credit nature, or the almighty: the credit for this wonderful creativity is all ours.

To articulate an "anti-technological" ideal of creativity today would amount to a rejection of the modern world. In the wake of a century and a half of staggering technological change, it should be quite clear that technical standards and methods are eventually surpassed. That some of the new methods seem too easy to be "artistic"has rarely prevented artists from using them. For men like Daguerre and Nadar, who were already successful before pioneering photographic media, it is clear that the potential of the photographic medium drove them as innovators within a new field of expression. Similar motivations have driven artists to adopt computers in their creative processes. But for most people who adopt new media tools today, the rationale for using such technology has little to do with a clear artistic or innovative purpose. In the years since the introduction of the personal computer, at the beginning of the 1980s, the software offerings have become less tool-like and more toy-like. Today people use technology because it is "cool" and fun, not simply because of what things it can help to create.

Figure 2 shows an interactive artwork that I made in 2001 named "Robotross—a pun meant to evoke both a robotic version of the TV painter Bob Ross and the mythic albatross sea bird, a symbol of inescapable troubles. The work addresses the issue of creativity in new media. Specifically, it is a mediation on the seductiveness, potential, and shortcomings of digital media as a vehicle for creativity. Unlike painting, which permits great latitude for content and stylistic choices, the Robotross interface implies that it offers paint brushes, but it actually only delivers pre-painted elements. While it is possible to configure this small collection of elements—a sky, a mountain, a tree,

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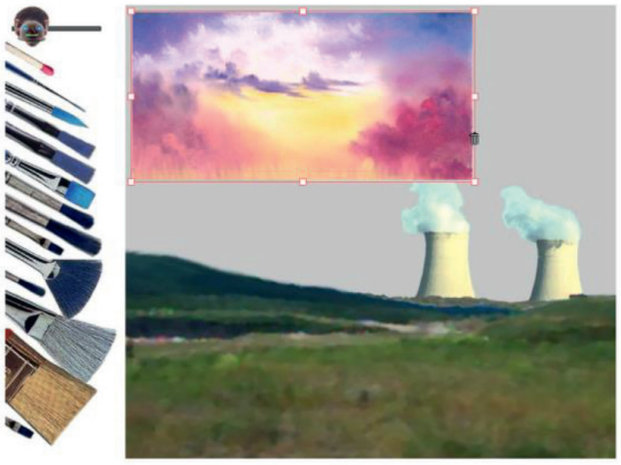

Figure 2.
Robotross, Andy Deck, 2001, artcode.org/robotross.

etc.—into a variety of digital "paintings," the transformation of the brushes into buttons that paste pictures calls attention to a restriction of freedom and control as compared to traditional painting. Robotross is a form of culture jamming that responds to a general culture of computing technology (and "computer art") that seems to take progress for granted. It poses the question of why artists would use and celebrate tools that force them to make images based on a limited set of model paintings? Ultimately, it seems that there is a novelty value in producing images in a new way, whether it is with Robotross or digital image filter operations that draw upon deep convolutional neural networks.

I am certainly not the first to reflect upon the impact of computers on the creative process. In the 1960s, A. Michael Noll produced a variety of monochrome images using computers and pen plotter printers. He also wrote perceptively about the artist-computer rapport.

> *In the computer, man has created not just an inanimate tool but an intellectual and active creative partner that, when fully exploited, could be used to produce wholly new art forms and possibly new esthetic experiences .... The artist's role as master creator will remain, however, because even though the physical limitations of the medium will be different from traditional media, his training, devotion, and visualization will give him a higher degree of control of the artistic experience. As an example, the artist's particular interactions with the computer might be recorded and played back by the public on their own computers. Specified amounts of interaction and modification might be introduced by the individual, but the overall course of the interactive experience would still follow the artist's model [10].*

In many respects the passage above is a reasonably accurate description of the actual relationship that many artist-programmers have attained with computers in the intervening half century. Yet like many enthusiastic pioneers Noll overlooked some pitfalls. With time it has become clear that in addition to being an "intellectual partner" the computer is also a product. Moreover, most people using it are not programmers. Consequently its software is, more often than not, a product, too. Commercial tools may require periodic relearning and sizable investments. Though in some respects artists may be "master creators" using such tools, in other ways

the artist is boxed in by programmers, lawyers, and executives in the software and computer industries.

This is not to suggest that software tools are always problematic. Like conventional tools, some are good and some end up in the back of a junk drawer. It is worth noting, though, that "creative" software is not the same as a brush. Paint brushes do not record your actions and location, and they do not put demographically targeted advertisements in front of you while you are working. Paint programs can. If software is an intellectual partner, and its savvy nature is coded into it by a programmer, then who is the creative force behind the interaction of the user and the software tool? The poet W. H. Auden insisted that the true men of action in our time, those who transform the world, are not the politicians and statesmen but the scientists. He made similarly dismissive comments about the impact of artists [11]. His provocative claim begs the question of whether science, engineering, and industrial design may be more creatively influential than the people using their PCs to make pictures and stories? Indeed, there are types of products that issue from software that are largely predefined by the hardware and software, leaving only minor decisions to the operator of the software. One example is children's "art" software, which often trivializes the creative process in the name of colorful entertainment.

To employ a baseball metaphor, are we headed for a period in which young artists grow up thinking that they have hit a triple when in fact software programmers have put them on third base? In some domains, like immersive and interactive entertainment, it is entirely possible that consumers of interactive narratives will not really care about the relative contributions of man and machine to their experiences. Indeed they may come to think of themselves as the co-creators of their own personalized adventures.

In the aforementioned column addressing ChatGPT, Albom asked it: "What would the writer Mitch Albom think about a computer-generated story?" It answered, in part, "as a professional author and storyteller, he may feel that the use of computer-generated stories undermines the value of human creativity, imagination and the emotional connection that a human author can create with the readers. Additionally, he may also feel that the computer-generated stories lack the unique voice, perspective and the emotional depth that a human author can bring to a story" [4]. Albom agreed. But the fact that the tool had anticipated his perspective is remarkable. Indeed it is easy to underestimate the potential of machine learning when it is the focus of research. When I first read Wendy Lehnert's 1981 treatise on narrative notations, her hand drawn plot units and narrative summarization seemed rather obtuse, if not preposterous [12]. Forty years later, that work has become foundational research into AI storytelling, notable for its event-driven understanding of narrative plots, and part of the broader field of narrative understanding. Whether by parsing the logic of events in a narrative, or by modeling characters and their relationships [13], or by analyzing visual changes from moment to moment in an image stream [14], synthetic "understanding" that seemed beyond systematization only a few decades ago is becoming a part of the software that we live with.

2. Conclusions

To conclude, there is a profound shift occurring in the realm of what has been known as creativity. Creative professionals are now lurching toward engagement with tools and practices that challenge assumptions about the need for expertise and

human intelligence in a wide array of art and design fields. More than ever before, humans are being guided through operations rather than using innate tools and internalized knowledge. These new capacities can be seen in both positive and negative lights. Either they represent low-having fruit to be exploited easily, or, alternatively, the shift represents a deterioration of creative control on the part of the artist, who operates in a playground of code that is largely written by others. One consequence of the emergence of simplified production tools is that seemingly anyone becomes an artist, writer, or designer. The barriers to entry drop, but at the same time, the prospects for careers in these domains dim. The emergence of artificially intelligent creative surrogates means that intellectual careers that used to seem to be safe from automation are suddenly at risk like manufacturing jobs before them. The significance for the broader culture of the destabilization of these creative professions is a matter of concern. Will the transformed cultural sphere be more derivative as its creative products are perpetually remixed? Will the easy tools engender habits of mind that are too reliant on software for ideas? Maybe the future is brighter than bright, but this is a moment of inflection for the intellectual and the next steps feel like they are into the unknown.

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