Modeling the Creative Process: Benefits, Methods, and Feasibility

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Introduction (Among Other Things)

Creativity is, by nature, a difficult thing to quantify. What is considered creative, and what is not? That can vary depending on whom you ask. According to Michael Grybko, a neuroscience research scientist and engineer from the Department of Psychology at the University of Washington: "In science, we define 'creativity' as an idea that is novel, good, and useful. It's a little broader than the Oxford Dictionary's definition, where it's just the ability to create, because that doesn't really say much. You can create something and it's not very useful or it just won't work well." Chief commercial officer of Rainmaker Digital Sonia Simon completely disagrees with such a definition, stating that creativity is "just making something… if you make something, you are creative." Furthermore, it is easy to only consider it in an artistic context: and while it is certainly an important part of the artistic process, creativity is indispensable in many different fields of study. Unfortunately, people tend to separate the world into two distinct categories: humanities (creativity) and STEM (intelligence). But they are not mutually exclusive, and they should not be considered as such by any means. That is not a phenomenon that occurs strictly for artists, is it? Certainly not. However, one might argue that creativity is a trait that is seen more often in those who practice the arts - whether that be music, writing, or painting - and perhaps they are correct. That same person may also argue that such a trait can be only inherited, and not learned. And again - perhaps they are correct. But the very idea of what is art and what is not can vary greatly from person to person, and it is an idea that has changed and expanded over time. Take the phenomenon of artificial intelligence art, for example. An artist runs thousands of painted portraits through an algorithm. What is produced is a piece of art based on the aesthetics of the works it was given. The final piece, though created by a machine, is something entirely new and is still art, right? The true definition of what is and is not art does not exist and likely never will. There will never be a correct interpretation of what art is because it will vary depending on whom you ask. For example, Pulitzer Prize-winning art critic Jerry Saltz has said he finds the art produced by AI artists dull. However, one of the very pieces criticized by Saltz, "The Butcher's Son" by Mario Klingemann, won the Lumen Prize.

All of this to say that if an AI can learn to create something unique, it does not seem far-fetched at all to think that a human can do the same. But where does one start? From what do they learn? To start, from those who frequently use creative thought processes in their work. While artists are not the only ones who do so, they are the first who come to mind for many. They also have the most visual and easily understood representation of such thought processes. So the idea is that these thoughts can be written down, analyzed and pulled apart, and subsequently modeled. These models can, ideally, be followed and learned from by those who are not as creative. This, of course, is not a perfect system. With something so ambiguous as creativity, there are nuances and unquantifiable aspects to it that are not so easy to neatly model. And the creative process can vary from person to person. However, that does not mean that attempting to do so is in vain, or impossible. There is much that can be learned from the creative thought process of even a single artist, and the results are consistent enough to be modeled in a clear, comprehensible manner.

Where to Begin and the *Infinite Landscape* Workshop

Again, where does one start? To begin collecting data - in this case, the creative process of a particular artist - one must begin with a situation in which they can use this process. An example of such a situation is the *Infinite Landscape* workshop. Over the span of five years, four such workshops were held at art museums in Japan and Europe. During each, a group of children (and in one case, adults) were shown photographs of different landscapes. From these photos, they drew their own landscapes. A visual artist then created a picture to go between every two landscapes, his work acting as a bridge between them to create a single, cohesive work of art. The artist would then record the ideas that occurred to him while creating these bridge pieces. Creativity was involved, but there were also commonalities between the types of things the artist looked for or actions that were repeated in each of the pieces. For example, the most common initiative taken was to take elements from both of the pictures and incorporate them into his piece. Now, this is not the only situation in which an artist's creative process can be recorded. Indeed, are creative processes not involved every time an artist picks up a paintbrush? Certainly. But to get the kind of data needed to create a model, it can be incredibly helpful to have guidelines in place. The artist could have made all the pieces himself. He did not necessarily need to have the workshops: he could have just as easily made two different landscapes and then created a piece to connect them all on his own. However, having the pieces that the artist had no control over makes it much easier to identify similarities in each of his creative processes. Furthermore, it lends the experiment more control and makes it much easier for others to replicate. One could repeat this process with any number of artists, to create even more accurate models - something that would be difficult without those original constants in place.

The Next Steps

The first step is to set up some sort of 'experiment' in which an artist must use their creativity to create pieces of work and have them record the ideas that occur to them while they create them. But what comes next? There are a few different approaches. One is to use the resulting data and find out what concepts or thought processes tend to be repeated. However, maybe the recorded thought process is more linear than just a combination of different ideas. An artist could have a creative process that has a relatively clear beginning and end. Again, this will vary from person to person, and why modeling creativity is not always one hundred percent perfect. You may always end up with a different result every time. That is why this kind of endeavor would benefit greatly from repeated attempts. The larger the data pool, the better. This goes back to the previously mentioned example of AI art. The artists behind the algorithm used upwards of ten thousand reference images to 'train' the machine. The more you have to draw from, the easier it is to discover repeated ideas and concepts that can be learned from. By identifying the most common processes, an algorithm could perhaps even be created to mimic the results of the *Infinite Landscape* workshop. An AI is given two images, and by using some of the processes used by the original artist, it creates a new photograph that acts as a bridge between the two original images.

Limitations and a Second Study of the Creative Process

One of the problems mentioned previously is the inherent imperfection of modeling a concept like creativity. One reason for this imperfection is that those from whom it must be studied are not perfect themselves. That is, in order to gain data to model with, we are forced to rely on and assume that an artist can accurately recall their process. Although it is a little strange to call myself such, I am an artist whose primary medium is painting. And trying to recall my

own creative process is a little difficult unless I am asked before starting a new piece. However, there are a few things that I tend to do whenever starting, working on, and finishing a work of art. To begin, I think about certain concepts, aesthetics, or subject matter that interests me. Recently, that has been celestial bodies - in particular, the sun and the moon. Then I look at objects or other works that include that specific imagery. Art can truly be anything, and so it can be a little daunting to attempt to go from nothing to a finished piece of artwork. But in an interesting study, *Modeling the Creative Process: A Grounded Theory Analysis of Creativity in the Domain of Art Making*, one of the things they discovered is that in many of the modeled steps in the process of art-making was shelving the work, or even abandoning it entirely. This differs from the *Infinite Landscape* workshop, in which the processes modeled were conducted in a more specific environment and the objective of the artist's work was defined before he began. In this particular study, sixteen artists - diverse in age, gender, preferred medium, and experience - were interviewed. All of them were preparing work for an exhibition, and their process during this was recorded and subsequently modeled. These artists were not creating art for the sake of having their creative process recorded and studied. Although not as controlled as the previous study, it yielded equally beneficial results. One such that creativity is not the product of one, theatrical 'aha' moment, but rather the culmination of many different factors. Is an artist's finished work any less creative if twenty works were started and abandoned leading up to it? Not at all. And this supports the idea that creativity is more than a trait to be inherited. It is something that can be learned and worked towards. It gets rid of the idea that the carefully curated pieces we see in art museums were not necessarily instantly thought of and easily created. I believe that is why the notion of creativity can be so envied, why people sometimes look at pieces of art and think to themselves 'oh, I could never do something like that.' Well, have they ever tried? Ever thought of the artistic and creative process as something that is not that simple for anyone, even artists? I recently had to create a series of works for an exhibition, myself. There were no guidelines: I could use any medium and any subject matter I wanted. I began with the process I mentioned above: finding subject matter that interested me, and going from there. As the process continued, and I began to physically put paint to canvas, there ended up being pieces that did indeed wind up in the trash. But that was not the end of the process, but simply a part of it, perhaps an integral one.

Discussion

So the final and perhaps most important question is: what does all this mean? At the beginning of this paper, and indeed throughout its entirety, I stressed the fact that when it comes to attempting to create a model of creativity, it will not be perfect. This is due to the limitations of gathering data solely from an artist's recollection, the nuanced nature of creativity itself, and the lack of one, true definite meaning. However, I also stated that this does not mean that the pursuit of such a model is in vain, or pointless. Quite the contrary. From the just two case studies analyzed previously, many beneficial conclusions were made despite the vastly different approaches both of them took. In one, a more controlled environment allowed for patterns in the artist's behavior to be easily parsed out. In the other, studying artists who were using a more natural and realistic workflow yielded results that are more applicable to a broader range of disciplines. Clearly, there are ways in which attempts to model creative processes like art-making is not just feasible, but it is also incredibly useful. It also helps to clarify it from a nebulous, abstract concept to something more tangible: a set of steps that can be easily followed. This sort of simplification not only opens up possibilities for those not particularly inclined towards

creative pursuits but to aiding in endeavors with AI. Models become algorithms that the AI can follow, and a machine being able to ‘think’ creatively is certainly an exciting concept. As both a computer scientist and an artist, I personally also find it incredibly important that there never be too harsh a divide between art and science. I think that reinforcing such a gap limits the potential of both. Creativity in particular is not something that is limited to the arts, despite the connotations that are typically associated with it. Similar studies as the ones above are incredibly beneficial to a great many people. As Dr. Grybko stated above, creativity can be “an idea that is novel, good, and useful” - certainly not a concept that is limited to the arts. Applying techniques, concepts, and ideas more commonly used in artistic endeavors that have been modeled to disciplines where they are more uncommon is an idea that should be further explored.

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