SHAPES, NUMBERS AND ALGORITHMS: THE CONDITIONS FOR ABSTRACT ART TODAY

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Hans Richter's famous piece *Rhythmus 21* is considered to be the first abstract film in the experimental tradition. The *Webdriver Torso* YouTube channel is composed of hundreds of thousands machine-generated test patterns designed to check frequency signals on YouTube. Could it be argued that, given certain necessary provisions, there exists a lineage connecting *Rhythmus 21* and *Webdriver Torso*? What would it be called? Are we at liberty to discuss the *Webdriver Torso* channel as an artistic marvel emerging from mathematical abstraction?

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Featuring a succession of shapes in black, white and grey, Hans Richter's famous piece *Rhythmus 21* is considered to be the first abstract film in the experimental tradition. Throughout its runtime of approximately 3 minutes, the constituent spatial elements of the work are comprised exclusively of the interaction of geometric forms—thereby drawing attention to the material properties of the medium of film: light, movement, and the screen as surface.

The *Webdriver Torso* YouTube channel[1] consists of about 500,000 videos, all of them featuring the same aesthetics—seemingly familiar red and blue rectangles randomly changing location, proportion and size. An asynchronous soundtrack of piercing, high-pitch pulse tones accompanies these. Initially the purpose of the channel was unknown, as was the identity of its operators. Various rumors circulated on the Internet and the channel attracted dozens of thousands of subscribers and millions of views. It was then discovered that the channel is operated by Google engineers, supposedly using it for testing the technical quality of image and sound on YouTube. In other words, these videos are intended as nothing but chroma and frequency test patterns. Moreover, it was also revealed that the videos are all automatically generated and automatically uploaded to the channel.

The aesthetic affinities between *Rhythmus 21* and the *Webdriver Torso* videos are easily discernible, even to the untrained eye. But what lies behind them? What do they disclose? Do they extend beyond the surface formalism of the projected images we recognize as abstract film or video? At first blush this claim seems difficult to prove. To start, *Rhythmus 21* was created almost a century before *Webdriver Torso* was launched. It also goes without saying that Hans Richter was human, as were the viewers of his film (then and now). Furthermore, Richter also pre-mediated *Rhythmus 21* as an artwork. On the other hand, the numerous videos in the *Webdriver Torso* channel have been 'created' by computers and not by humans. They are similarly intended for 'viewing' by computers rather than by humans. Finally (and perhaps most crucially), they were not designated as artworks. Thus, according to traditional aesthetic criteria, *Rhythmus 21* can be understood and categorized as a work of art whereas *Webdriver Torso* cannot. How then should it be understood and categorized? Is it more than an endless series of meaningless technical information?

Nonetheless, the affinities in question here are, in many ways, quite damning. Could it be argued that, given certain necessary provisions, a lineage can be drawn to connect *Rhythmus 21* and *Webdriver Torso*? And if we follow with this 'thought experiment',

1. "Webdriver Torso Youtube Channel," https://www.youtube.com/channel/UCsLiV4WJfkTEHH0b9PmRklw/videos

what would this lineage be called? *Rythmus 21* can be considered as a work of geometrical abstraction, that is a work whose pictorial language is based on the use of simple geometric forms placed in non-illusionistic space and combined into nonobjective compositions. Are we at liberty to discuss the *Webdriver Torso* channel as an *artistic* marvel emerging from another sort of abstraction?

The assertion we set out to examine here is thus twofold: **1**. *Webdriver Torso* is an indicative artifact of a process (or family of processes) called *mathematical abstraction*. Arguably, even if mathematical abstraction does not yield artworks in the traditional sense, it does bring about a set of circumstances that pertains to some fundamental definitions of art. The persistence of these circumstances suggests that the framework they operate within ought be considered as relevant, if not pivotal, for thinking creatively about art *today*. **2.** If we take into account the core principles of conceptual art and computer art (as they have been defined by Frieder Nake) mathematical abstraction *can*, in some cases, be considered an extreme form of art.

However, before we delve into the locus of our inquiry, a few words about early abstract art are in order. There are various historical roots and philosophical presuppositions that eventually lead to the gradual rise of abstraction in various places in Europe. Accordingly the emergence of 'pure' abstraction in the 1910s is narrativized in several ways, but most often with one of three protagonists: Kazimir Malevich, Wassily Kandinsky or Piet Mondrian. The different traditions of abstraction also echo a variety of philosophical, political and aesthetic positions. Nonetheless, no matter the particular tradition of abstraction, or how one understands the positions it grew from, the underlying principle of all such traditions is one. It is the desire to gradually strip away from the picture (and henceforth from art) the visible traces of reality until all discernable elements of worldly phenomena are eliminated.

Put plainly, abstraction is a process of reducing expression into the most essential of forms. It is therefore possible, even appropriate, to name reduction, removal and elimination as the core concepts of modernist abstraction—common to all its lineages and differentiating them from 19th century realist painting. But, if abstraction is defined as a mode of strict restraints, then arguably it is not the outcome that deserves attention but the methodology. Abstraction may be spiritual (a search for 'essences') but it also procedural—it is the technological breaking of action into constituent, operative components. In other words it is the reinvention of artistic expression as a series of operations that are (or

can potentially be) streamlined. (Later we shall even argue that abstraction can also be understood in terms of *quantification*.) Furthermore, when these operations are *notated* they can form 'new' matter or new information. This capacity, we believe, is not only the root of abstraction in art; it is also the very same capacity that underscores artificial intelligence.

Put differently, abstraction and technology are not unrelated; neither do they follow divergent principles. Rather they are inextricably entwined. In the context of the early 20th century this is observable when thinking about modern art within the broader history of modernism. The rise of modernism, we should bear in mind, was concurrent with the rise of industrial and reproductive technologies. This given, technology itself often became the subject of modern art. Modernism, in other words, should be recognized as, at least in part, responsible for the advent of abstraction in the visual arts.

What's more, the artistic goals of what we now call modernist abstraction are also simultaneous and comparable with many cutting edge scientific quests that took place around the turn of the century. Physics, chemistry, experimental psychology, and other sciences were all similarly engaged in the deconstruction of the inanimate, biological and psychological realms into simple, further indivisible elements. Thus, it can be easily established that the gradual move toward abstraction in art echoes the same zeitgeist, argued Lev Manovich convincingly. Just as physicists, chemists, biologists and psychologists strived to break down reality to its basic constituents, so did the artists of the time. They too attempted to articulate the basic elements that constituted their field of inquiry

Using motion as his means of investigation, Hans Richter challenged the cinematic experience by applying musical principles to it. Arguably it is the 'music' created by the transition of its elements that lends *Rhythmus 21* its geometrical abstract quality. (Of course similar concerns can be identified not only between separate fields of inquiry but also within them. In other words Hans Richter obviously took inspiration for the title and theme of his film from other abstract artists who similarly titled their works with musical terms—for example Kandinsky or František Kupke.)

In fact, abstraction in this film is more than a successful attempt to do away with a mimetic image of the world. The disavowal of the direct connection to the external world and the elimination of narrative constitute this piece as a self-sufficient, 'closed' ecosystem. Or, to use Philip Allain Michaud's words: "everything that appears on the screen proceeds from the shape of

the screen itself: the rectangles that grow or shrink are screens parallel to the screen; the lines sweeping horizontally or vertically across the projection's surface are screens perpendicular to the screen. There is thus no more difference between the nature of the screen and the nature of the images projected onto it."

Rhythmus 21 thus becomes, perhaps similarly to Malevich's black square, an investigation into the circumstances and conditions of *its own* existence. These circumstances and conditions are: material (the screen as surface), cognitive (the movement and transition of elements on that surface and their 'imprint' on human eyes and minds) as well as ontological (the logical transformation of world into rhythm). Thus, for the time of its creation, this gesture was radical—an attempt to undercut the suspension of reality that usually underpins the cinematic experience, and, concurrently, the revolutionary suggestion that some aspects of that reality may be replaced by radical abstraction. Today, almost 100 years since the gesture of *Rhythmus 21*, the same methodology is at play.

It can easily be said that the videos posted on the *Webdriver Torso* channel also examine and expose their own conditions of production. In that sense they are a link on the same continuum that dates back to the early 20th century. In other words (and in stark contrast to Manovich who identifies contemporary forms of abstraction with "the sciences of complexity") we are not only arguing that *Rhythmus 21* and *Webdriver Torso* are comparable in many superficial aspects. We further posit *Webdriver Torso* as descending from similar concerns as well as continuing the same structures that yielded *Rhythmus 21*. Thus, the inclusion of Webdriver Torso in the tradition of abstract art is, in our view, a foreseen stage in the transformation of art from visible, to procedural, to conceptual, and then to the exclusively algorithmic. We shall shortly delineate this transformation with the aid of Sol LeWitt and Frieder Nake.

Are we then at liberty to scrutinize *Webdriver Torso* in exactly the same ways as we did with *Rhythmus 21*? Yes but with extreme caution—because such scrutiny, as will soon be made clear, not only confirms that *Webdriver Torso* videos share many traits with abstract art, it also, at the very same time, breaks away and makes redundant the overarching principles of what we are accustomed to identifying as art in the first place.

Nowadays artists are routinely expected to question and explore their own processes, to be able to tie their concerns to broader narratives and metanarratives. Moreover, it almost goes without saying that an artist must problematize the lineage and contexts he or she belongs to, if they wish to expand them.

Yet this was hardly the intention of the Google engineers behind *Webdriver Torso.* And so we ask: does the continued interest in these videos, even after the mystery surrounding their origins has been dispelled, hail a new metanarrative for art? Can it be argued that these machine-generated videos are not an anecdote but a long overdue expansion of the epistemological frameworks of art? Do they have aesthetic qualities unique to them? Can it be proven that strangely these videos *are* comparable to man-made artifacts that are considered art? Could this channel be considered as an artistic genre, or even medium, of a unique kind? Perhaps it can.

In an article discussing the development of test patterns on different media, Adam Rothenstein suggested that the *Webdriver Torso* videos promote a "new aesthetic test pattern for contemporary technology." And so, even if the videos call to mind artifacts of the geometric abstraction tradition (which were all carefully, and manually, crafted by human artists), labeling them as art objects still requires extreme caution (or a modest leap of faith) because such labeling clearly challenges our familiar conventions of what art is. This is due to the clear lack of authorship here, and the apathy towards their ontological standing.

As part of such inquiry we must also discuss another important quality of *Webdriver Torso*—that it is not only virtual and immaterial, almost-entirely independent of location or time, but that it also exists, and will continue to exist, regardless of whether it ever 'has' an 'audience' to 'view' it and irrespective of whether that audience is comprised of humans or machines.

This characteristic of *Webdriver Torso* places (or rather abandons) complicated questions on the doorstep of art. For we not only know that that creator of these videos was not human, we also do not know the ratio of human (as opposed to machinic) viewers. This, to reiterate, is an entirely new phenomenon. Furthermore, the fact that an open channel of quality assurance process has become a modest attraction, in and of itself, reveals the extent to which the workings of the post-industrial technical apparatus (which underlies most artistic media production today) are, to most of us, entirely opaque and unknowable. Otherwise, as Daniel Rubinstein notes, why the ongoing tendency to refer to them with bucolic metaphors such as clouds, shadows, streams, farms and flows?

Earlier we explained that the abstinence that produced modernist abstraction was closely linked to the dominant scientific paradigms of its time. We shall now name the broader symbolic actions, or layers of asceticism, that brought rise to this paradigm. These, we argue, are still the backdrop for the scientific

paradigm of *our* time. This will support the claim that some autonomous computer-generated media outputs are, in many ways, a radical manifestation of the same conditions that, at least since the mid-twentieth century, have defined art.

To do so we now turn to the late media philosopher Vilém Flusser who consistently dissected and discussed the evolution of humanity in terms of abstraction. The symbolic role of sculpture, argued Flusser, was to abstract the four-dimensional continuum of space and time into a three-dimensional sign. This sign then stood for the continuum but, because of its dimensional reduction, it could also be manipulated. Some early examples for that are gravestones, the pyramids and obelisks of various cultures. A further symbolic (or ascetic) act consisted in signifying a three-dimensional scene, object or sign through a two-dimensional surface-sign. This way a dying person, or an existing gravestone, could be signified by a painting of a pieta, for example. This once more increased the possibilities of manipulation. A third symbolic act according to Flusser was the replacement, or denotation of the two-dimensional through the alleged one-dimensionality of the written text. Linear writing, as Flusser often referred to it, thus represents even further recession into the non-concrete, into the form of code we call 'the alphabet'. Importantly, it also endows humans with a new capability, the capability of 'conceptual thinking'.

Then came the fourth symbolic act, which was the replacement of the one-dimensionality of linear writing by what Flusser and also Friedrich A. Kittler identify as 'zero-dimensionality' of numbers or bits. Flusser calls this zero-dimensionality 'the universe of technical images'. Kittler calls it 'the world of the symbolic' or 'the world of the machine'. Either way, and no matter the terminology one opts for, the movement of human communication towards extreme abstraction, can, according to this overarching narrative, be alternatively defined as the gradual cultural abolition of all natural dimensions.

What all phases described in the previous paragraph have in common is what Kittler called the *n*-1 dimensional signifier. What we must bear in mind in this context is that the *n*-1 dimensional signifier does not only reduce one dimension in every phase. More importantly, it *conceals*, *disguises*, and *distorts* the signified, that is, the *n* dimension. Thus, the last 40,000 years of man can also be defined as the process by which all human modes of expression have been abstracted, ephemeralized and finally replaced by electronic modes of code.

We shall now go one step further to suggest that not only modes of expression but also other cerebral functions can be, and in fact have been, replaced by electronic functions. By 'other cere-

bral functions' we now mean the human penchant for mysticism that is commonly called creativity—in other words the desire to 'make' art. But in order to claim that an algorithm that automatically spits out ready-to-air videos is 'artistic', or even 'an artist' we shall have to leave the inner contradictions of Flusser and Kittler for a different occasion. Instead we shall briefly define the 'art' in 'computer art' to bring the arguments of this paper to a close. This will be done with ideas that are by now familiar from another form of art that similarly appeared after the emergence of electronic code—that is conceptual art.

It is all-too-rarely acknowledged that early computer art had much in common with other art forms that emerged around the same period: high-modernist hard-edged abstraction and, more importantly, conceptual avant-garde art. The brotherhood between these artistic genres, all born around the 1960s, a time of turmoil and calls for social-change, is marked in the immanence of concepts. Crucially both conceptual art and computer art can be understood as ousting traditional artistic values—most notably the (manual) craft required for the physical execution of the individual work of art. Instead both place emphasis almost-exclusively on the process and on the ideas that govern it. In fact, this ideological similarity is made apparent and accessible in a manifesto published in 2010 by Frieder Nake—a mathematician and a pioneer of computer art. Importantly, Nake's "Paragraphs on Computer Art, Past and Present" borrows its style from an earlier manifesto—Sol LeWitt's 1967 "Paragraphs on Conceptual Art." This earlier title is acknowledged, quoted and some of its core principles are elaborated.

In his manifesto, Nake names 3 great principles of computing machinery. These are: computability, interactivity, and connectivity. Computability, he argues, appears in the arts as algorithmic art, Interactivity appears as interactive installation and connectivity appears as net art or software art. We shall utilize some of his intriguing arguments on algorithmic art to support our definition of mathematical abstraction.

Computer art is "art from a distance" argues Nake. The computer is necessary for the art process by mediating and fulfilling the artist's ambition. It then automates the production of the perceivable, material component of the work. In algorithmic art the artist can potentially create (in fact they must create) an entire *class* of art works (not just an individual work). The artist thus works in the realm of possibilities and potentialities, not just of in the realm of realities. The work of art in algorithmic art is, in other words, the description of infinitely many possible works.

Computer art is conceptual art states Nake, but insists that concepts in computer art are somewhat different from concepts in conceptual art. In computer art concepts appear as operational descriptions. This is significant because algorithms are descriptions: "finite descriptions of infinite sets." Moreover, algorithms are descriptions of dynamic processes. However, these descriptions have a unique standing: they are operational and executable. That is, they are text and machine, at the same time. To recall, LeWitt proposed that in conceptual art "the idea becomes a machine that makes the art." Here the machine is the text and the text is the idea—*idea and artwork become one*. Nonetheless it is important to clarify that computer art is conceptual art insofar as it describes an idea and does not show the material work. Since its description must be operational or computable, the concept can be carried out immediately without mediating media. If the conceptual artist ever wanted to realize his description of an idea, he would need an appropriate kind of media to do so.

Nake's underscoring of the process of reduction as elemental for conceptual art is especially relevant to our argument because it makes clear that conceptual art was another step in the continued reduction of human expression (the n-1 dimensional signifier). This reduction reached the point of the concept or idea itself. There can now be no work of art without a concept at its root. In conceptual art, the concept is considered more important than its realization but algorithmic art takes this yet a step further: ideas and their descriptions in algorithmic art *must* be codes. This code is incorporated into their own execution. Whereas in conceptual art there is an inherent delay between concept and the production of the artwork, algorithmic art immediately delivers the conceptualized piece and could go on realizing the same concept for centuries. The algorithm is perhaps artistic concept in its strictest form of description—the final form of art in times of industrial and post-industrial production.

Does it matter then that a particular algorithm was never intended for artistic purposes? Probably not. If we take art as a form of perceptual magic we can see that it changes through time. When forms of perceptual magic change, so do the material conditions of living generally, and technologies and modes of representation, more specifically, all must change too. In time these changes teach us to think in particular ways appropriate to them. That is, they condition us, their makers. This holds true for drawings, written words, technical images and algorithms. Put differently, the incorporation of mathematical procedures into artistic creations was, from its outset, bound to change the definition of art. For if, predetermined probabilities *are* what determines the visible aspects of the work of art, then what difference

does it make if these probabilities are calculated by humans or machines? After all, we humans, the pinnacle of natural creation (as we once believed ourselves to be) also rose through repetitive calculation and transmission of pre-programmed information. And what difference does it make if these probabilities are observed by machines and not by humans?

It ought to now become clear that information processing before transmission can unleash a plethora of intriguing artistic possibilities. This is why genetic engineering and artificial life can be taken as art forms, and artificial organisms should be considered works of art. Down the road such processes, and others like *Webdriver Torso,* may lead to unexpected results. The unexpected of course poses a threat but also constitutes a promise for an evolution of art *by means of mathematical abstraction*—the expansion of its operational possibilities to more senses, channels and manifestations. The proposition we wish to present today is not that these 500,000 videos are necessarily art, but that they offer us opportunities to marvel at the new avenues provided to art by the apparatus, the algorithm and the program. "The idea becomes a machine that makes the art" wrote Sol LeWitt almost 50 years ago. This is especially true today, given that some machines can, quite literally, make what some of us take as art.

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