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**SPECTACULAR MACHINERY
AND ENCRYPTED
SPECTATORSHIP**

Abstract

This paper argues certain types of contemporary computation have a spectacular dimension which is consumed today as magic. Using popular images created through Generative Adversarial Networks (GANs) as a case study, I analyse the conditions of production and consumption of imagery generated through machine learning as a type of popular culture, I then compare this creative use of computing with magic shows and the cinema of attractions of the early twentieth century. This approach combines notions of digital cultural materialism with theories of early film spectatorship to suggest an emergent cultural trend: monstrative global computation as a form of spectacle.

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What you are about to witness is not magic, it is purely science.

— Robert Angier

Techniques are like seeds which bore fruit in the soil of magic.

— Marcel Mauss

We need to talk about GANs

Machines for automatic learning are neither creative nor intelligent devices themselves, but they are indeed awesome. While attributions of machine agency in most academic circles are fraught, at least for now, there is undeniable enthusiasm about the possibilities that these technologies appear to enable in and beyond academia. It is therefore surprising to find that very little attention has been paid to the one aspect about automated learning where there seems to be wider social consensus, which is the affective dimension of these systems: that these machines are awesome.

They are awesome in the literal sense, in that they can be awe-inspiring, cause feelings of reverential respect mixed with fear and wonder. But why? How can, for example, images produced through these techniques be as emotionally affecting to a general audience when the mechanisms for their creation are based on notoriously dry and emotionless statistics? And why has this affective quality been overlooked in many areas of scientific machine learning research?

Machine learning techniques have captured the imagination of researchers and practitioners in seemingly disparate fields, to the point where news outlets are now struggling to make sense of the cornucopia of literature on the subject, which finds its

way into the public domain under the broad conceptual umbrella of *artificial intelligence*, coming from all fronts, pitched at many different levels of detail, and applied to an equally diverse set of problems, from diagnosing and treating cancer (Cruz and Wishart 59-78) to playing *Starcraft* (Vinyals et al.). Agreement about the sense of wonder produced by these hitherto obscure algorithms is not always explicit, but it is clearly there.

My first intuition as to how to investigate the affective powers of machine learning was to look at how it has spilled into the arts. And perhaps the best example of this is the recent wave of enthusiasm for generative adversarial networks (GANs).

GANs are a type of unsupervised machine learning algorithm comprised of two neural networks pitted to outperform each other. The idea was first introduced by Jürgen Schmidhuber (1990) and was further developed and made popular by Ian Goodfellow et al (2014). The technique has since engendered several applications, most notably in synthetic generation of photo-realistic imagery (See for example: <https://github.com/nashory/gans-awesome-applications>), and in the process it made Goodfellow somewhat of a celebrity in machine learning circles. The MIT's Technology Review described him hyperbolically as “The man who’s given machines the gift of imagination” (Giles), and as of today his original GAN paper has over seven thousand citations in Google Scholar. Granted, this academic celebrity is far removed from actual celebrity, but still, for a technical paper this is remarkable: “GANs have come from an exotic topic to the mainstream and an exhaustive list of all GAN papers is no more feasible or useful” — summarises Holger Caesar, who until 2017 maintained an online list of papers on just this one machine learning technique (See: <https://github.com/nightrome/really-awesome-gan>).

What is also interesting is how artists more than scientists were among the first to whole-heartedly embrace the use of GANs in their practices, and with very successful results too. German artist Mario Klingemann, now a self-styled *neurographer*, for example, had an interesting but mostly niche career until he started using GAN and GAN-esque algorithms between 2015-16 to produce portraits, or perhaps more precisely, *ectypes* (See: Floridi 317-321). Public interest in his work grew dramatically thereafter, as evidenced by the artist's own collection of press clippings, which had increased tenfold by 2018 (See: <http://quasimondo.com/>)

Almost at the same time that year, a painting created by a trio of French students using the same technique auctioned at Christie's for \$432,500 USD. The auctioneer's website promoted the piece with the question: "Is artificial intelligence set to become art's next medium?" (Christie's; Cohn). The elevated price and some clever marketing put the technique and its practitioners in the public spotlight, to the delight and dismay of some of its proponents, including Klingemann himself, who commented disparagingly at the time:

To me, this is dilettante's work, the equivalent of a five year old's scribbling that only parents can appreciate [...] But I guess for people who have never seen something like this before, it might appear novel and different.
(Vincent)

Klingemann's own work would go on auction a few months later, in early 2019, this time at Sotheby's, which promoted his piece *Memories of Passersby I* as eliciting: "an aesthetics that shocks and disturbs as much as it appeals, a mix of attraction and repulsion whose principal effect is to present a surprising new perspective." (Sotheby's)



Figure 1: *Memories of Passersby I* by Mario Klingemann.

Whether we like it or not GAN-art has gone mainstream, and in the sciences as in the arts, machine learning has never looked so awesome. And yet, descriptions like the ones above, journalistic articles and editorials in specialised art publications, are frustratingly unhelpful in directly questioning why these images are emotionally affecting for the wider audiences they are clearly begetting, people who for the most part neither understand nor care about neural networks, loss functions or backpropagation.

Even when artists were quick to adopt these techniques (or perhaps because of it), their critics and them seem to lack the language with which to address the immediate affective quality of the images produced through techniques like GANs. These limitations, I believe, come from artists and art critics persistent understanding of machine learning as a medium of sorts: a conjectural space that affords stylistic diversity and the potential for aesthetic experience; a new material and social surface for artistic

expression. The problem with this view is that it very often implies an unquestioned over-reliance on what Noël Carroll (13) calls the medium-specificity thesis: the requirements of differentiation and excellence that supposedly afford mediums their autonomy and their unique powers of expression — injunctions such as films show, do not tell; games enact, do not show, etc.

Going by this logic, the discussions about images produced through machine learning have focused on issues of originality, authenticity and authorship, and this preoccupation with finding the unique artistic affordances of machine learning and how authors deploy it in their practice tends to devolve into claims of different degrees of machine autonomy as the defining feature of the medium: the quality that makes imagery produced through this type of machinery original, and ultimately different from, say, a Photoshop filter. The artists themselves have been either incapable of dispelling these claims or actively complicit in perpetuating them. And critics too, as Carroll remarks, have confused history with ontology (13), asking audiences to endorse an *AI style* under some questionable assumptions about the nature of the medium, i.e. its alleged deployment of non-human agencies.

This is not only the case with opportunists and outsiders, even well-established artists like Klingemann, who publicly and vehemently rejects claims of machine autonomy, struggle to defend their turf in terms other than style and mastery of the *GAN medium* and are unable or unwilling to articulate non-essentialist views of their production. In late 2018, when Klingemann won the gold award at the Lumen Prize, the event publicized it as: “For the very first time, a portrait created by a machine has won a major global art prize.” (Lumen Prize)

From this quick romp through the early history of GAN-Art it is evident that imagery

produced through some of these machine learning techniques struck a chord beyond the research communities from whence they came. It is also apparent, however, that general discourse about machine learning in the arts contributes little to our understanding of why (or even how) this is the case.

In what follows I propose a different approach. I suggest that images produced through machine learning techniques like GANs are not awesome because they are the differentiable production of an artistic *avant-garde*, but on the contrary, that they are awesome because they are recognisable *en masse*; because they are consumed not as art but as a particular type of popular entertainment. My central argument is that machine learning is emotionally captivating not because the machinery is intelligent or creative, but because it is spectacular, and in this, I argue, the way we consume imagery created through these techniques today has much more in common with stage performances in the early twentieth century, with the cinema of attractions, and particularly with magic.

Anatomy of a magic trick

Around the same time GANs burst into the scene, cinema put our fears and wonder about these technologies on screen in films like *Her*, *Transcendence*, and *Ex Machina*. These three films deal with the possibilities and consequences of a synthetic intelligence indistinguishable from ours, they are interesting and in many ways enjoyable films, but like the headlines of auction houses they also significantly misrepresent the nuts and bolts of contemporary machine learning in science and engineering research.

A glance at the current flurry of papers on machine learning easily confirms that they are overwhelmingly about applying techniques from computational statistics (classification, clustering, regression, rule inference) to specific problems, like credit card fraud detection, playing chess, or style transfer. Progress has been made for the most part by going narrow, rather than general.[1] The recent breakthroughs in the field, Daniel Dennett writes,

have been largely the result of turning away from (what we thought we understood about) human thought processes and using the awesome data-mining powers of supercomputers to grind out valuable connections and patterns without trying to make them understand what they are doing.[2] (Dennett 87)

This narrow or weak AI paradigm suggests that we should not look to science fiction but to history, and also that perhaps it is not that films get it wrong, but that we are looking at the wrong films. If we want to understand machine learning not as synthetic intelligence or creativity, but as magic, I suggest we take our cue from a film about magicians, a film

like *The Prestige* (Christopher Nolan, 2006).

The Prestige portrays the misadventures of two rival illusionists in 1890s London, Robert Angier and Alfred Borden, who try to outperform each other in obsessive and increasingly dangerous ways. Borden develops a magic trick called *The Transported Man*, in which he appears to teleport instantly to opposite ends of the stage. Intrigued and frustrated, Angier spies on Borden and tries to replicate the trick, first using a double, and eventually commissioning a cloning machine from American scientist Nikola Tesla. After much speculation, personal drama and murder, it is revealed that the way Borden performed the transported man was by concealing from everyone the existence of a twin brother, with whom he shared not only the stage but also his wife (eventually driven to suicide because of the inconsistent personality of what she presumed to be an individual but were in fact the twins).

The plot of the film is structured as a series of flashbacks in which the magicians take turns at reading the other's stolen diary. Much like the generator and discriminator modules in a GAN,[3] their rivalry pushed the boundaries of magic, albeit in very different ways: Borden and his twin accomplish the illusion by concealing a lifetime of duplicity,



Figure 2: *The Transported Man*, magic trick - A.

while Algier achieves it through a scientific machine that actually duplicates him. In the film, scientific machinery and social performance are seen as two constituent traditions of magic; two ways of producing the same magic trick.

Semantic echoes aside, I also like this example because it allows us to think seriously about how magic implicates labour and technology for spectacular effects. Magic, writes Marcel Mauss in his *General Theory of Magic*, “is the domain of pure production, *ex nihilo*. With words and gestures it does what techniques achieve by labour” (175). A magician, he continues, “does nothing, or almost nothing, but makes everyone believe that he is doing everything, and all the more so since he puts to work collective forces and ideas to help the individual imagination in its belief” (175). Despite being over a hundred years old, Mauss’ anthropological account of magic illuminates a forgotten link between technique and showmanship, or in other words, of how magicians play with social expectations of what is technically possible. In the case of *The Transported Man*, for example, the magic occurs not because the magician cannot be at either end of the stage, but because he appears to travel this distance at an impossible speed. The trick only works

if we, the audience, believe the person who vanishes from one place appears to be the same person that reappears instants later elsewhere — that Borden somehow manages to travel in ways that defy common experience.

But consider, following Mauss, how disbelief is always historically situated. We can imagine for instance how nineteenth century audiences would have probably found equally incredible that a person could fall asleep in London one day and wake up in Manila the following day, and how before air travel became common in everyday life this too could have easily been construed as magical. From this perspective, the illusion of teleportation is only a function of our perception of the time needed for the necessary transformations required to displace matter in space. Consider then, how the illusion of travelling at *the speed of light* is profoundly connected with the social imagination about technologies like electricity, radio, the telephone, and indeed the kinematograph, in the early twentieth century.[4] John Cutter, the *ingenieur* working with Angier (played by Michael Caine in the film), at one point advises the performer: “if you need some inspiration, there’s a technical exposition at the Albert Hall this week. Engineers, Scientists,



Figure 3: *The Transported Man*, magic trick - B.

you know [...] That sort of thing catches the public imagination.” (*The Prestige*)

The originality of Mauss’ approach was to show how magic worked by regulating the social interfacing with technologies, his work is not only a description of ritualised magical practices, but an analysis of how these practices are specifically designed to amplify weak collective beliefs and disbeliefs so as to render them effective at specific moments in history:

Magic protected techniques; behind magic they were able to make progress. [...] Magic is linked to science in the same way as it is linked to technology. It is not only a practical art, it is also a storehouse of ideas. It attaches great importance to knowledge — one of its mainsprings. (175)

In my view, some aspects of the current technological moment with regards to machine learning deeply echo those of the early twentieth century: once again we are, like Angier says in the film, “on the brink of new terrifying possibilities,” and once again the boundaries of what is technically possible are softened enough so as to present and sell technology as magic. My argument here is that machine learning is being presented to us as a series of magic tricks: instant retrieval, disembodied cognition, as creative or intelligent machines, all of which bear the clear social hallmarks of the magical: they are deployed as forms of alchemy[5] (with the right algorithm you can convert your data into gold), animism (the machine thinks and speaks for itself), divination (big data and predictive analytics), and healing (genome decoding and editing). Symptomatically, corporations who wield these powers even present themselves as overtly magical, even in their nomenclature, think for example of *Oracle* or *Palantir*. [6]

Echoing electrical technologies of the early twentieth century, machine learning too disrupts our relationships with perceived time and labour in powerful ways. Indeed, it is my contention here that the main magic trick performed through machine learning systems consists in using statistical computation for the compression of time through what Matteo Pasquinelli calls “the ideological encryption of labor within technology” (321). Pasquinelli argues, albeit in a wider context, how classical energy theories of labour[7] have “failed to recognise the new forms of *technified labour* and *technified subjectivities* that have lost any resemblance to the new labour struggles of the past” (321). If we admit his revision of classical Marxist economics, we can easily see how through vast infrastructures of planetary computation different kinds of subjectivities can be encoded, harvested, packaged and sold back to us, through machine learning, as instantaneous projections of “artificial” knowledge or creativity. But of course, there is nothing artificial about these subjectivities, it is our perception that is being surpassed since we cannot yet grasp the encryption of labour at a global scale. As with *The Transported Man*, we could also understand GAN imagery in these terms, as magic protecting technique: the trick being, to present the results of encoded subjectivities and encrypted labour all at once.

Think for example of the thousands of images of European portraits Klingemann fed to his *Old Masters GAN* in terms of encrypted labour, and one can then appreciate how he is compressing a thousand years of European portraiture tradition into an instant of release.

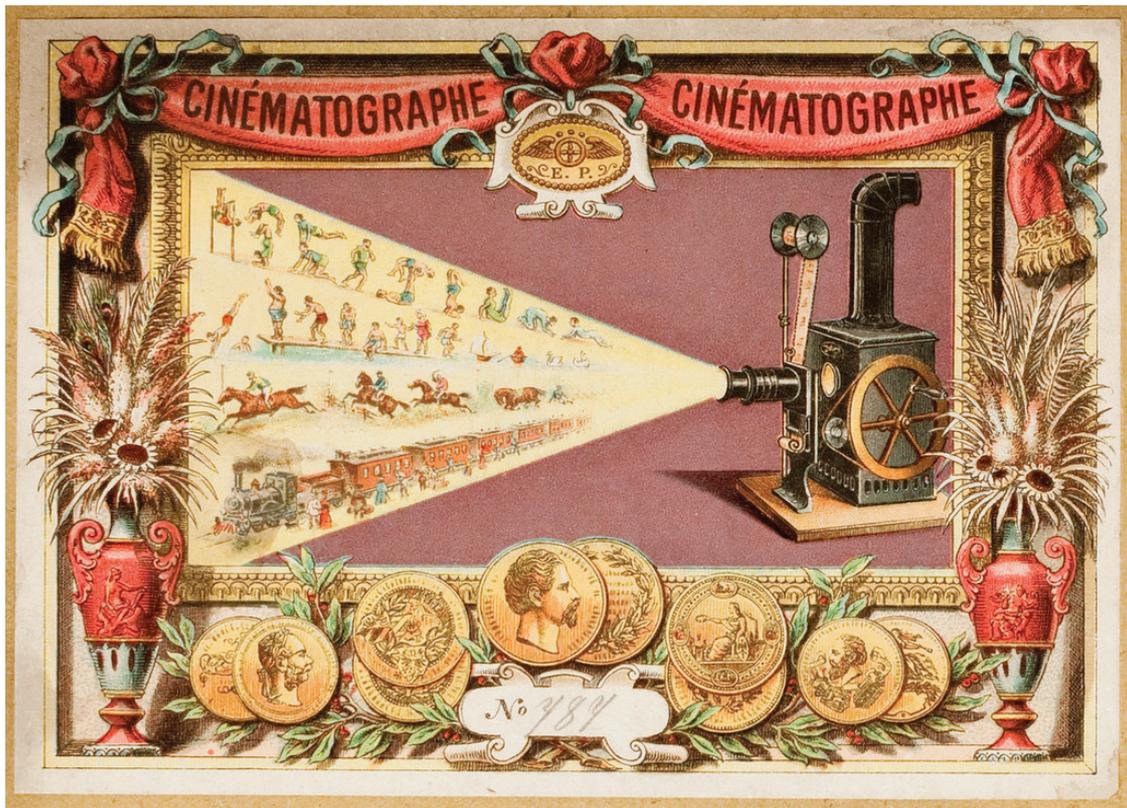


Figure 4: Cover to the box for a *Cinématographe*.

Spectacular machinery

Having dissected the magic trick, let us come back to our original question: how are general audiences affectively bound to the pictures created through machine learning such as GANs?

Like a magic show, for the trick to be successfully carried out the audience needs to actively participate with their beliefs and social imagination of what is possible. We need to have the disposition to be deceived and to be amazed; we need to buy the trick as entertainment. My claim here is that we consume pictures created through machine learning today in a similar way to how film scholars have characterised early twentieth century audiences consumed cinema: not as cinema, but as attractions; as spectacular demonstrations of technological

achievements. In his influential essay on the cinema of attractions, Tom Gunning referred to this type of spectatorship as popular exhibition of *trick films*:

Nor should we ever forget that in the earliest years of exhibition, the cinema itself was an attraction. Early audiences went to exhibitions to see machines demonstrated (the newest technological wonder, following in the wake of widely exhibited machines and marvels as X-rays or, earlier, the phonograph), rather than to watch films. It was the cinématographe, the biograph, or the vitascope, that were advertised on the variety bills in which they premiered, not [LE DÉJEUNER DE BÉBÉ] or THE BLACK DIAMOND EXPRESS. (383)

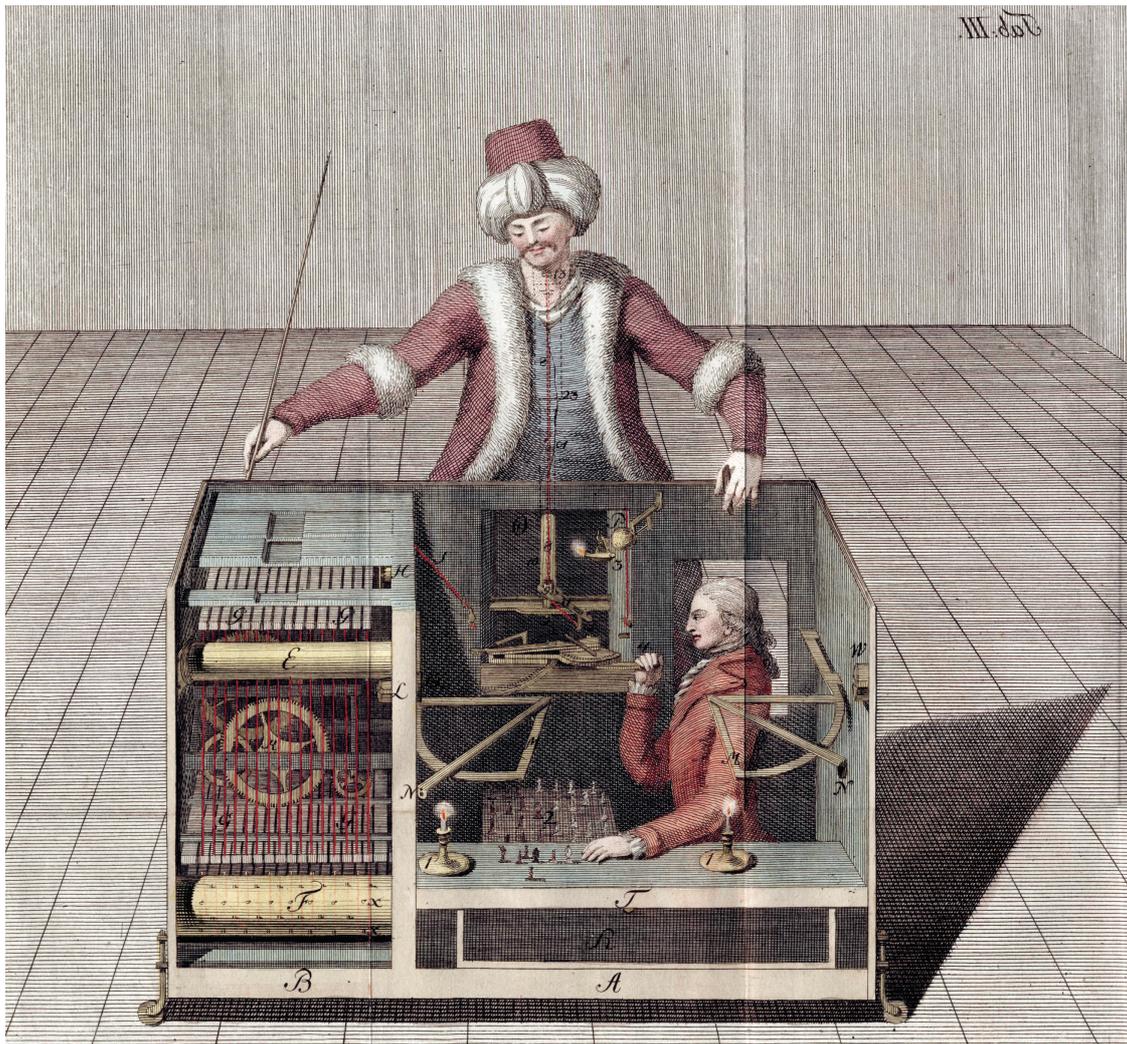


Figure 5: Cross-section of the Turk.

André Gaudreault, who worked closely with Gunning, went as far as to suggest a revisionist history of the birth of cinema, a version in which neither Edison in 1890, nor the Lumières in 1895, invented cinema, but only the devices later used for it: the Kinematograph and the Cinématographe.[8] According to the film historian, cinema came into existence more than a decade later, in the 1910s, when the conventions of theatre and performance were assimilated into films as institutionalised products with a recognisable narrative form. Gaudreault describes the twenty years between 1890 and 1910 as a period of “kine-attractography” whose

practices greatly differed from what was later called cinema:

Between the time of the invention of the basic device (between 1890 and 1895) and the period of institution (beginning around 1915), kinematography was a wide-open field of experimentation. This was when artisanal manufacturers of animated pictures took various initiatives, almost all of which tended to modify the initial project inscribed, so to speak, in the ‘genes’ of the apparatus (or, if you prefer, in the various patents filed by its many inventors. (39)

Both Gunning and Gaudreault described this *cinéma des premiers temps* in terms of its capacity to *show* the new techniques: slow motion, reverse motion, multiple exposure, and even the close-up, which we now take for granted as part of narrative cinematic discourse, but which, Gunning argues, at the time was seen “in itself [as] an attraction and the point of the film” (384).

Furthermore, already in the early twentieth century, these machine attractions — kinematography included — conflated notions of the *showable* and the *knowable* under the logic of spectacle. The shows that invited audiences to suspend disbelief, as we saw through Mauss, also served as ways to deploy new technical intellectual regimes. And there is, of course, a rich older history of automatons being exhibited as “intelligent” attractions[9]: Wolfgang von Kempelen’s *Mechanical Turk*,[10] for example, which was presented as a mechanical chess player to impress the Habsburg court in 1770 (Schaffer et al. 154), or even John Bowes’ *Silver Swan* of 1872, which Mark Twain described as having “a living grace about his movement and a living intelligence in his eyes” (Twain in Holledge 13). Automata were symbols of the enlightenment, writes Simon Schafer, they “were both arguments and entertainments, designed seductively to place craft skill within the setting of power, and to allow the selective entry by that power to the inner workings of art and nature” (135–36).

From the courts of Europe to the burgeoning urban elites of industrialised cities, this model of spectatorship based on attractions historicise these moments of rapid technological development when societies find the machines themselves as mystifying; when technologies have not yet been tethered to particular usages, captured by specific sectors of society, or institutionalised into coherent social discourse, and audiences are therefore still able to project

their own fantasies onto the machine’s raw potential more or less freely.

Spectacular machines can in this way be presented as immediately awesome, they seduce by showing, rather than persuade through reflexive absorption. And technologies for observation are particularly alluring in this regard for their capacity to create trickery that reveals: distorted ways of seeing (like the microscope or the kinoscope), that simultaneously implicate intellect and imagination, and that give both the production of knowledge and the creation of fiction an immediate, often spectacular visual manifestation. Viva Paci calls this, in the case of early cinema, “the attraction of the intelligent eye” (121–38).

I argue machine learning too embodies this double function today: it can be understood as a set of observational technologies that affords us with spectacular *trucages qui révèlent*. This is, I believe, the best way to understand how we currently consume GAN imagery, not as expressions of a medium but as spectacular demonstrations of the GAN itself.

The advantage of this analytical approach inspired in the cinema of attractions is that it allows us to bypass the idea of *AI style* altogether, since the attraction of the intelligent eye operates equally on the gooey portraits of Klingemann or in the photorealistic *deepfakes* which are created through the same technique but look entirely different. What attracts us is not the style, but the workings of the machine. And this is not the self-reflexive aesthetic modality of an art that is questioning and testing the limits of its own medium, but a much more general allure, one that accounts better for the popularity of this form of picture-making. Furthermore, I want to advance the idea that this is also a viable way to more generally characterise the current affective resonance of machine learning in visual culture: not as a

tool for representation, but as a magic show contingent on the mystifying process through which computation at a planetary scale can encrypt subjectivities and labour.

To be clear, I am not suggesting all imagery produced through machine learning is designed as a magical attraction, there are of course a multitude of configurations of machine learning systems, processes, intentions, and a rich melange of techno-social palimpsests, some of which will surely find new ways to negotiate their way into broader areas of visual culture. And similarly, we have to distinguish from the relatively small group of artisans of technoscience trying to outdo each other's tricks in academic machine learning research and the business of big data analytics, which is already institutionalised into large corporations mostly concerned with extending their encroachment in society at large through sophisticated forms of digital governance and wealth extraction.[11]

My argument is, rather, about consumption. I submit that there is at this moment a popular appetite to consume these images as the magical results of *monstrative global computation*, much like there was in the early days of cinematography for tricks and effects with moving pictures, and that besides novel ways of creating and analysing imagery, machine learning systems afford us with novel ways of enjoying imagery; they fetishise calculation and the statistical apparatus that makes it possible, and they turn the datafication of society into its own form of spectacle: *spectaculum ex computatio*. I believe we are living the early days of these forms of computational spectatorship. Goodfellow may have invented GANs, but the medium which will allow us to enjoy sequencing without continuity, narrative without authorship and, ultimately, presence without subject, has not yet been invented.

Notes

[1] There is research in so-called strong AI or General AI, but practice in this field has been dwarfed into a sub-field in the past decade. Other significant related areas in computer science and philosophy include computability and computational complexity.

[2] First emphasis is mine, second one is the author's.

[3] "The magic of GANs lies in the rivalry between the two neural nets," states Martin Giles in the same piece where he calls Goodfellow "the GANfather."

[4] This theme of time relativity and how it has profound effects on social relations features heavily in other films by Christopher Nolan, for example in *Interstellar* (2014), where a cosmonaut and the young daughter he left behind on earth live their lives in different temporalities, and he is later able to re-encounter her as an elderly woman. Or *Inception* (2010), where a crew of specialised dream bandits go through nested dream levels, each with a temporality relative to the level above and below. In these films Nolan knowingly references the origins of cinema and seems to be acutely aware that one of the greatest powers of cinema as a technology was to afford us with new social understandings of duration.

[5] See: <http://supercommunity.e-flux.com/texts/the-alchemic-digital-the-planetary-elemental/>.

[6] *Palantir Technologies* is a US software company specialised in big data analytics. The *Palantíri*, or seeing stones, are a set of interconnected magical orbs in J.R.R. Tolkien's *Lord of the Rings* mythology. They

allow their users to communicate and have visions of future or past events across the world:

The palantír replied to each, but all those in Gondor were ever open to the view of Osgiliath. Now it appears that, as the rock of Orthanc has withstood the storms of time, so there the palantír of that tower has remained. But alone it could do nothing but see small images of things far off and days remote. Very useful, no doubt, that was to Saruman; yet it seems that he was not content. Further and further abroad he gazed, until he cast his gaze upon Barad-dûr. Then he was caught!
(Gandalf, in *The Two Towers*, Chapter 11.)

[7] Pasquinelli mostly refers to Marxist notions of labour as transformation through energy, and he argues this view has ignored the latent productive potential of information.

[8] These two are similar but not exactly the same device, although they were developed almost in parallel, one by Edison in the US and the other by the Lumières in France.

[9] *Musée de la Magie* and *Musée des Automates*, in Paris, are adjoining twin-museums for which one can purchase a single ticket.

[10] von Kempelen's Turk was initially presented alongside magic tricks, and travelled through the courts of Europe playing exhibition matches and igniting speculation in scientific circles about its mysterious functioning. There was for a time a strong belief that the Turk operated through magnetism. After the death of von Kempelen, the Turk was uncovered as a hoax: a small man was inside the cabinet,

and the gear noises served to conceal his presence. Amazon named named its "Human Intelligence Tasks" marketplace after this automaton, see: <https://www.mturk.com/>.

[11] Corporations pluck techno-artisans from academia whenever necessary, of course. Big tech in effect buys out the results of a more malleable field of experimentation. Once engineers and scientists are turned, so to speak, data fencing becomes an issue that then separates them from their original research communities. Marx may have called this the subordination of techno-scientific labour to capital.

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