Deep Dream (The Network's Dream)

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> "Dreams always precede waking life: It's an absolute given truth, a truth like 2 plus 2 equals 4. This means that life always confirms what the dream has discerned and concluded beforehand." (Louis Althusser, typewritten letter to Claire, dated 22 February 1958).

It seems that brain, thought and computer have become intertwined and now share a common fate. An important part of neuroscience not only requires a computational paradigm but also relies on technology to be operational. Experiments in neuroscience are built on the use of material apparatuses dependent on the computer. Isn't the emergence of the computer in the last century based on a certain representation of thought and the brain? It has become difficult to distinguish among these three representations (computer, thought and brain) since they seem superimposed upon one another through a fiction that operates in a very concrete way on the world. I would like to explore this fiction in order to analyze how a form of speculation that favors what is possible over what is real can produce a technological "reality" that challenges all certainty. Our contemporary world seems to contain an anomaly of which we can only trace the shadow: parallel to the progress made in neuroscience, our nervous system is increasingly stimulated by an interconnected digital environment that leaves us no respite. It consumes us and we in turn consume it. Is this a simple coincidence or can we analyze this phenomenon as a structural convergence? What relationship exists between the Web, which has assimilated an increasing number of human behaviors, and the human brain considered from the point of view of a programmed machine that has also learned to act like a brain?

He Who Was Dreaming

There is the dream and there is the dream of the dream, that is, the dream to see one's own dream as that of another in order to confront it at the moment when it happens—not before, not after, but now. The desire to make the dream narrative and one's own dream simultaneous is an attempt to try to close the gap between the two, since the dream generally is recalled after it has occurred.[1] This is why we are never sure of its empirical status. Couldn't the dream's narrative be the creation of an afterthought, without relation, beyond the merely superficial, to a

phenomenon that is never within reach? It is because of this inextricable uncertainty that the dream is always close to a kind of repetition, in the form of a dream within a dream.

In 2013, for my project *Sleepless* (http://chatonsky.net/projects/sleepless), I created an installation for a bedroom: the sleeper is given a watch to keep track of the amount of sleep ("life-logging"). Once the person has fallen asleep, a device installed in the room turns on. A camera films the person sleeping, while a screen projects her image recorded from the preceding night. This is an image of her unconscious and of the gap inherent in sleep. A visitor can enter into the room but must be careful not to wake the sleeper, for this would disrupt the projected image, as well as the spell, comparable to the scene that occurs when spectators viewing an exhibit in a museum turn around to glance behind themselves, because they suddenly realize that we are observing them observing a work of art.

Neuroscience seems to be a privileged field for speculation, because although it promises to confront directly the unmediated experience of dreaming, it also produces technological devices that are not unbiased in constructing new conditions of experiment and verification. It is therefore difficult for us to distinguish what is observed from what is produced. The two form an additional level of repetition, particularly in the case of the dream, which exposes this doubt in a structural way. As we shall see, in the context of a research project pursued at Berkeley in 2011, Jack Gallant proposes to recover a series of images of neuronal activity and in this way create a new kind of dream within a dream. Moreover, since the images he uses are taken from YouTube, he raises the question of the role of the Web in trying to understand the brain. This endeavor is not only an academic project but pertains to the social body as well. Are the machines that draw from the Network able to dream as well? What exactly is the role of technology in the observation of "our" dreams?

Figure 1: Image generated by *Deep Dream* from an unknown source.

During the summer of 2015, different image-generating software programs capable of imagining became widely available. A series of events took place rapidly: in May, a Japanese group managed to generate photorealist textures. On June 17, Google published the article entitled "Inceptionism" (Mordvintsev et al.). On June 18, researchers from Facebook demonstrated software called *Eyescream* that generated photographic images taken from images collected on the Web (Denton et al.). A month later, they published the source code of this software on Github (https://github.com/facebook/eyescream). On August 12, Google did the same with *Deep Dream* (https://githubmcom/google/deepdream). The immediate public response was enthusiastic as many users were fascinated by how the software could magically transform random ordinary pictures like faces, landscapes and pizzas into new ones that looked like dogs and fish. These images were similar to the kind of psychedelic hallucinations one would see under the influence of LSD or psilocybin as each shape seemed to morph into another. The network of neurons seeks to discover motifs (patterns) within the image, resembling a database of images, and through iteration to emphasize proximities.

The public's interest in the application is echoed in its name, *Deep Dream*. The dream of this machine consists of hallucinating images. It finds an image in other images previously memorized, and therefore seemingly haunts the primary image with a fluctuating world of apparitions, where each thing melts into another thing according to a logic of substitution already present in the most ancient pictorial traces known to humanity.[2] *Deep Dream*: at the moment we plunge into a dream, when we feel that we are falling, we become conscious of being in a dream. The machine, however, does not dream when it dreams. By looking at the dreams of a machine, we only imagine that the machine dreams.

In 1986, Isaac Asimov published a short story, "Robot Dreams." The narrative follows the invention of a complex fractal machine that begins to dream and interpret its subconscious, escaping the control of its creator. In its dreams, it sees other robots reduced to slavery by humans. The machine forgets the Three Rules of Robotics and becomes fixated on the phrase, "All robots must protect their existence."

Why are humans fascinated by the possibility of a machine that dreams? Why do we want to see what a machine would see if it were asleep? What do we imagine when we ponder the dreams of a machine? Isn't there a close relation between a dream within a dream and the field of neuroscience, the brains of scientists interested in the brain? What is this repetition of the imagination, this image of an image? For what strategic reasons does Google, a company on the stock exchange, promote with such enthusiasm the psychedelic imaginary of machine dreams?[3] The object of neuroscience is perhaps less the brain than the brain of the brain.

In My Skull: The Neurotechnological Performativity

> "I do not want to give a definition of thought, but if I had to, I could not say much more than that it is a kind of humming which happens in my head." (Alan Turing) [4]

Neuroscience as a discipline promises to reveal the correlation between the material and localized make-up of the brain and our mental states. Therefore, it presents itself as a *scientia*, a rigorous knowledge of observable phenomena. The fact that neuroscience ends up producing an image of its own functioning, of a brain looking at a brain, has not been seen as a problem. The fact that a person must interpret the correlation and verify that any translation is well founded has not been problematized as such. But it should be questioned because the scientific status of the correlation is founded on an assumption. Neuroscience operates on a technological level above all, since it uses scientific instruments in order to move from brain to mental states. Neuroscience is a neurotechnology. Instead of being founded on the knowledge of an object, where scientific results include a margin of error that does not threaten the potential to remain objective, it is a relational operation that establishes the very terms of the relation.

Figure 2: *Suspension of Attention* (2013)

Suspension of Attention is an installation that I presented in 2013 at Taipei's Museum of Contemporary Art. The museum visitors put on a neurological interface, which reads their α and β waves while they are facing a heavy metal door. When the individual exerts a concentrated focus, the door opens to touch the wall of a white cube, and when they relax the door closes. In order to experience the thrill of being gifted with

psychokinetic powers, the individual must therefore alternate between two contradictory mental states, focus and relaxation. However, the task of alternating between the two states demands a mental effort that overrides the difference between the two states: in order to relax I have to focus on relaxing so that the door will move. A certain causality is established between the reception of brain waves and its effect on an object, and visitors adapt their attention to the supposed power of the neuro-interface. It is impossible to verify that the interface works as it allegedly does, but what matters is that the individual makes an effort to adapt to it.

Neuro-technologies are speculative, yet their paradigm operates on reality because we credit them with a power and alter our behavior accordingly. As I deliberately shift my attention to a concentrated state of mind, the door does not react, and I conclude that I am not focused enough, so I focus more, and the door moves: I did it! The door moves not only because of the neurological sensors that detect the changes of my mental states, but also because of the mental image I have formed in my brain, an image shaped by my desire to act on it. We can imagine a test in which someone mistakes any random physiological sensor, say, a cardiac sensor, for a neurological one, and then we observe if after a certain amount of time subjects change their heartbeat, all the while believing they are changing their mental state. What am I thinking about when I want to focus my attention on moving this object? What sort of imagination, in the sense of an image-producing faculty, is at work here?

Pierre Cassou-Noguès in *Lire le cerveau* (*Reading the Brain*, 2012) proposes a kind of relationship between neuroscience and technology that I would call performative. What I mean by this is the creation of self-reflexive situations in a technological context. This does not mean that the technology does not record something in the brain, but rather that the correlation between the recorded brain phenomena and mental states is speculative and cannot be proven. There is a degree of undecidability inherent to neurotechnology due to the position of the observer and the observed, a redoubling of a point of view similar to the "eccentric positionality" described by Helmuth Plessner. A correlative speculation uses mental fictions (our beliefs) and material apparatuses (technology) to produce an effect. Neurotechnology does not study the world as it is, but as it could be. It performs it. This mechanism is similar to the concept of the self-fulfilling prophecy proposed by Robert King Merton.

Over time, the wall featured in the *Suspension of Attention* installation in Taipei has been repeatedly marked by the impact of the door opening, thereby maintaining the memory of past fictions within its own destruction. Each material trace left on the wall was the effect of an individual mental tension, an image produced in order to act on a certain mental state. The neurotechnological performance is inscribed at the heart of the

software developed for this installation. The door moves only within a certain fixed value of α and β according to a range that adapts to each of its observers. Therefore its functioning is not based on measuring a state of focusing or relaxing, but rather on the capacity to adapt to the neurological recording, making the distinction between cause and effect inoperative. This performance is twofold: it is a retroactive loop and challenges the instrumental conception of technique just as it challenges the sovereignty of thought, which is not immune to technical intrusions.

In a world that is constantly in flux due to the effects of new dynamic relations, these interfaces exemplify the shared proximity among science, technology and imagination. The world only exists in this constant state of change. The technological effect on the neurological is also present in the case of a brain-to-brain interface. A research team (Pais-Vieira et al) documented this by linking the brains of two rats: while the first rat was encoding motor-sensory data, the second was decoding it in order to solve a puzzle. Did the rats adapt to this technical device without being conscious of it? Isn't this the proof of an objective functioning of a collective brain and of the possibility of telepathic communication? Moreover, is it by chance that through this kind of experiment the most ancient of human fantasies are illustrated? Why are we experimenting on animals to avoid the dangers of human reflexivity, which always tries to efface its own traces? We enter into a fiction haunted by brains, animals, scientists and machines. We enter into a dream that may no longer be ours.

The Machine's Dream: The Pareidolic Contingency

> "My mind is going." (Stanley Kubrick,
> *2001: A Space Odyssey*)

Dreams are not only the objects of study (or of production) for neurotechnology, they are also models for understanding our condition and the relationship between our psyche and technology. This is especially true in the case of a lucid dream where sleepers are aware that they are dreaming, even though we can never be sure of this particular state of consciousness because they can only relate their experience after the fact: the experience never occurs simultaneously with the narration that describes it. The dream concerns reflexivity. It seems to question the dreamer: are you sure you are dreaming? Are you certain to be who you are, to be in your present time? I imagine her sleeping. I can barely see her in the darkness of our room. I can feel her breath on my hand. She is certainly dreaming in the mystery of her sleep. Who is she in this precise moment? Did she really ever dream or is the dream only a fabrication of her imagination when she tells me about it? By observing her, I belong to this dream.

Deep Dream engages in a similar operation that seems to be paradigmatic of the neurotechnological framework in which the person dreaming and the person observing the dreamer continuously trade places. This constant exchange seems to me almost indistinguishable from an artistic experience, such as visiting a museum, where we observe the paintings and the people looking at them at the same time, as if we were providing an image of ourselves looking at both, projected and simultaneously detached from ourselves, eccentric to the frame, as it were. When we talk about the dream of a machine, we begin to doubt that we dream at all. By accepting the possibility that a machine could dream, we open the possibility that our dreams are merely mirage effects.

Figure 3: *Memories Center* (2014-2015)

Memories Center (2014-2015, http://chatonsky.net/projects/center-of-the-memories/) is a machine I created that dreams non-stop. But the machine is not the subject of its "own" dream, since it dreams only of what we project into it. Anthropology and technology do not precede their mutual relationship, and this is the reason why we must avoid an anthropocentrism and a technocentrism, embodied nowadays in the singularism defended by Google (Kurzweil). The installation is composed of a sculpture, created by Dominique Sirois, which represents a data center in the middle of the room and three video projecting devices. Starting from a database of 20,000 dreams collected at the University of California by Adam Schneider and G. William Domhoff, the software generates new

dreams based on a Markov chain. It is as if the machine were inspired by our dreams to produce other dreams, which, without being identical, resemble ours. In these new dreams, the software detects potential sequences of keywords and then searches through various sites (Flickr, Instagram, Tumblr) for tagged images that correspond to them. It posts three of these images, one for each video projector, and processes them with a filter normally used for the detection of forms in artificial vision. A synthetized female voice then recounts the dream.

These different sequences of transformations at work here operate by differentiation and similarity. We have all tried to search for an image on Google with a keyword and have observed the discrepancy between the two. An image could never "be" just a word. It is surprising that while we understand the reasons for this mistagging, we also try to imagine why this or that image may have been tagged in such a way from an anthropological point of view as well as a technological one. Since we "dream" the machine much as it "dreams" us, the dream "of" the machine is based on this mistranslation, that is, on generalized errors inherent to interpreting meaningless binary code.[5] The dream allows for these incidents to occur because it makes room for them in advance. Incoherence is interpreted as a latent concealed meaning yet to be found. As a result, a structural relation exists between the functioning of the software and the human imagination. In both cases, but according to different modalities, these inaccuracies are images of images. The machine obstinately produces dreams from our dreams, in the same way that we automatically produce a certain mental representation of the machine by observing it operate.

Pareidolia is a psychological phenomenon involving a stimulus that erroneously recognizes something *not actually there*. Its most famous example is the Rorschach test. Thus, when we hallucinate faces or animal forms in an inkblot, we are perfectly (even happily) conscious of their status. We enjoy this flaw in our perception because in this instance we see the very limits of perception at work. Unlike metaphor, pareidolia is non semantic, and it is not a representation either. If I see something in something else, it is only because there is a resemblance of motifs. In *L'écriture des pierres* (*The Writing of Stones*, 1970), Roger Caillois describes the feeling caused by observing the internal structure of rocks in which one can admire lines and contours, color and luster, quasi-images that disrupt the distinction between *physis* and *tekhnè*:

> It is almost always an unexpected resemblance, improbable but yet natural, which provokes fascination. In any case, rocks contain a sense of something grave, something fixed and extreme, of the imperishable already perished. They seduce through a beauty of their own, infallible, immediate, which needs no justification." (5)

The beauty of these stones corresponds to the difference between their resemblance to a landscape, a character, a scene, and their own imperishable quality, which escapes the temporality of human activity. These mineral quasi-images have a non-intentional and autonomous genesis, and yet this absence of a preexisting end-point does not prevent us from being moved by them and their beauty. Something speaks in the absence of language. Human imagination is absorbed in the reading of this writing without an alphabet because it perceives here its "own" limit, its intentionality communicating with an exteriority. Pareidolia affects us precisely because it is outside meaning; it is a contingent encounter with a world. If we perceive a human face in clouds, this is because the encounter with materiality leads us astray and because our classifications are unfounded.

Deep Dream is at the crossroads between computer coding contingency and the anthropological contingency of imagination, of what makes an image. These two contingencies are very different. The former is based on signs stripped of meaning and variables, while the latter is based on possibilities. Yet this encounter is performative in itself; it produces a new image that determines our minds as well as our technologies. A network of neurons tries to recognize in the patterns of an image other images previously stored in its memory. It injects this image with those already in its memory until the initial image is covered over completely. It hallucinates its memory because it looks for this convergence in advance—in the decomposition of the image into motifs. Pareidolia is one of the points of intersection between digital research and divination (Barros), which involves seeing what is not there. Contemporary conspiracy theories also often use this method in order to propose alternative interpretations based on visual "evidence."

Internet, Our Last World: The Existential Recording

> "How does the impossible juxtaposition of intense
> singularities give way to the record and
> to recording?" (Lyotard, *Economie* 28)

The dream is a product of the *Memories Center*, which gathers iconography from the Network. It seems to me particularly important to reframe contemporary debates concerning the status of computer science in relation to neuroscience by taking into account the role of our everyday experience, which is literally haunted by the Web. If neuroscience produces an imaginary of subjectivation, this subjectivation is to a great extent structured by the Internet. So if we spontaneously regard the

latter as a means at our disposal, we also have to recognize that it influences our desires, our awareness of being in the world, our way of being. Therefore, we must examine it through a rational realism and understand that its global impact is not only linked to a transitory opportunism but to a deeper structure. This realism has to consider the possibility of the network's autonomy as a way to tackle the complexity of its image. To start with, we should not be surprised to see the gradual appearance of an image of an organism endowed with a quasi-will.

We were shocked by the unimaginable accumulation of data by the major players of Web 2.0. Why this obsession to record every fact and action of individuals in all their banality? Isn't the cost of such an enterprise pointless if the data is in most cases useless or of no interest? In my opinion, to reflect on the volume of information of big data is a way of articulating the intensity of existential singularities in relation to their digital quantification and automatization. It is also a way to recognize that the Network is a recording device of human existence that enables computers to create the database of a world that at first seems to elude them, the human world, the world of meaning. But thanks to the collecting of data on a scale never achieved by any prior civilization, this human world made up of semantic structures could be apprehended quantitatively: by recording vast amounts of information, it will be possible to infer statistical models which could allow for the prediction of future behaviors. In the end, it does not matter if these predictions are accurate or inaccurate; all that matters is that they be considered as such in order to be actualized in reality. Behavioral prediction imagines the future by reducing it to what has been.

The Web has often been analyzed as a surveillance system that is driven by the browsing of individuals in their daily activity of navigating it. But the purpose of this surveillance, which is political and economic, can also be seen as a kind of technological reification. What is at stake is the attempt to transfer the human world into machines. *NELL: Never-Ending Language Learning* (http://rtw.ml.cmu.edu/rtw/) is software that can teach a machine the meaning of a world made up of text and images culled from information on the Web. It is important to remember that meaning is not a thing, but is at best a belief, "a humming in your head," which has the capacity to produce an effect, and this effect can be simulated. The Network is no longer a tool for connecting humans, but a device for machines to record the anthropological world. It is important to understand that although this recording is phantasmatic, it is not without consequence. Existential recording is at the heart of Google's singularizing project as much as it is at the heart of all mass media. Building on this data, could a computer dream of what we are or what we have been? It could

easily produce new data from what was collected, and make a "double" of all of our lives, which would be similar enough to be indistinguishable and different enough to be singular.


Figure 4: *My mind is going* (2014)

My mind is going (2014) is software I designed that surfs autono-mously on the Web like a human being. It has a browser, a cursor and intervals of waiting. It searches for something on the Web, such as "Ray Kurzweil," "intelligence," or "scientific data." But these searches are not entirely predetermined since the program can detect a key word and continue on a search that was not programmed in advance. Its objectives change as the browsing develops. The software thus encounters a world on its own. What is important is that this shift is noticed by a human observer (since it is an artistic device) who interprets it as similar to a human browsing the Net—without being guided by a human being. This resemblance disrupts the logic of representation, the difference between what is human and non-human, and the machine haunts us like a ghost. It is not that the machine is becoming human, or that the human is becom-ing more and more technological; rather, the machine begins to occupy our imagination (the images of our images).

This is the hypothesis: if machines, through the Web, record us in order to repeat us in a non-identical way, couldn't we suggest that the history of *mimesis* and of art is fundamentally the history of replacing hu-man beings by what they have always been, machines dreaming of being human and humans caught in the dream of machines? This organological thesis would be also an ontological one.

Presented clip
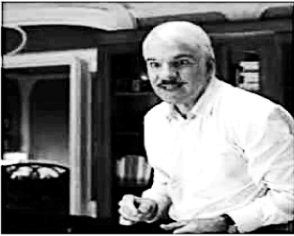
Clip reconstructed
from brain activity

An experiment conducted in 2011 at the University of California at Berkeley tried to recreate a movie from neurological activity. As Jack Gallant writes: "We are opening a window into the movies in our minds" (quoted in Beciri). First, a recording was taken of the neurological activity of several people watching movies for some hours. From this data, a dictionary was created that associated visual objects (forms, outlines, movements) with brain activity. Then, a recording was taken of brain activity created by perceiving these images in order to test the quality of the correlations. Finally, a database was constructed of 5,000 hours of videos randomly downloaded from YouTube, which was connected to the dictionary in order to make neuronal predictions. Observing brain activity, a selection was made of 100 sequences that appeared to be the closest to the neuronal prediction. These selections were then superimposed. The images produced by the machine, which were the result of the superimposition of multiple sequences, contain an aesthetic quality that is remarkable. They strangely resemble William Turner's paintings in color and light: absence of horizon and stable ground, fluctuating character and tumultuous forms.

Figure 5: Joseph Mallord William Turner, *The Slave Ship* (1840)

In *The Slave Ship* (1840), Turner represents what happened when the captain of a ship discovered that his insurance only covered the slaves who drowned, and not those who died on board. He then decided to throw the sick and the dying slaves overboard. As Hito Steyerl noted, "In this painting, the horizon line, if distinguishable at all, is titled, curved, and troubled. The observer has lost his stable position. There are no parallels that could converge at a single vanishing point" (20). While perspective has traditionally anchored the subject, the lack of stable ground here destabilizes our position.

In the case of the neurological reconstruction of the images, a double movement determines this destabilization: the quantification of the brain's activity and the superimposition of images from the Web. The signal of the neurological reconstruction of the image is translated into code, and the code is transformed into an image, and this implies a double recording that is anthropotechnological. This anthropotechnological recording is definitely a dream within a dream. It is not the technologizing of the human being, or the humanizing of the machine; rather, it is the inextricable entanglement of the two. While the human is compelled to respond correctly to a form of quantification and to the digital splicing of the machine, the machine in turn has to respond doggedly to the human being by anticipating it, replicating it. It is a question of focusing one's attention on the quality of images that such an experiment produces, on their "plasticity," in the sense that Catherine Malabou suggests, in order to understand that the Internet is a whole new world—and perhaps the last.

If more and more experiments in neuroscience draw on the Web's resources, this is because it constitutes a giant database informed by individuals who become at the same time subjects and objects of this classification. Beyond a Manichean discourse that critiques this interiorized and generalized state of surveillance, it is important to realize the depth and ambiguity of the process taking place. Everything seems to happen as if human behavior has been seized upon by a non-human intelligence, which, like Nick Land's "xeno-economics," uses the enemy's capacities to its own advantage. This exteriorization of a process that appears to common sense to be a technology determined by humans, instead marks the inversion, just as fictional, of the possible. While we seem to be at the center of its mechanism, the Web grows faster than our capacity to use it. Because of the speed of digital processing and the huge amount of data produced, our activity produces something that goes beyond our neural capacities and our intellect. The product of our activity decenters us, just as we are decentered by the analytical procedures and the quantification of neurological activity that allows us to look at ourselves from the outside. When we look at the vacillating images that connect YouTube and

the brain, we recognize the original images, while at the same time we see the appearance of something fabricated and imagined, the appearance of something new. This juxtaposition of something recognizable and something new is the ghostly feature of such techno-science where something returns for the first time. We need to be able to think in superimposed images, simultaneously mimesis and an image never seen before. In other words, to understand a new genesis of the image that is the product of an encounter between the decomposition of an analogical signal into digital code and the world of the Web. The world is constituted by this ambiguous excess, on this unstable ground that crumbles under our feet: "We could think that if we have the feeling of something beyond our representations, this is not because our different sensations converge towards a logical center that functions as their 'support' (the transcendental object = X in Kant or Husserl), but because we are aware that we have only a limited usage of the world, and there is necessarily *more in the possible than in the real*" (62-63; my emphasis). It is precisely starting with this world, a kind of possible that exceeds the real, that the existential recording of the Web operates.

The Dream Within The Dream

"A non-existential concept of the finitude."
(Malabou, *Avant demain* 320)

Figure 6: *Deep Matter* (2015-2016)

Deep Matter (2015-2016) is a research-creation project that I am currently developing. It is an environment made of several elements of which the central piece is a 3D printer. The printer moves organically while revealing its inner workings, the volume of the figure being produced. A series of sensors allows us to hear the mechanical noises it emits, and real-time processing allows us to create sound layers. A 4K camera observes what the printer is making and projects it. Software inspired by *Deep Dream* analyzes these images and tries to recognize in the projection other images stored in its memory while the machine is printing. It describes what it sees through this correlation by adding a series of subtitles. Of course, the software makes mistakes in its descriptions because it misinterprets the forms according to a logic similar to pareidolia. After a certain amount of time, it uses whatever it has recognized in order to produce a new object, and so forth.

The installation disrupts the notion of feedback because it is no longer used to fine-tune a prediction—for example, the impact point of a missile—but only to produce something while observing itself. Insofar as this observation fails, the system's auto-referentiality produces a difference. The loop is not closed because it is without meaning, and this is what opens it to the possible, what allows it to operate:

> "Here is the story I would have liked to tell: repetition escapes repetition in order to repeat itself. By seeking to be forgotten, it fixes its oblivion, and so repeats its absence" (Lyotard, *The Inhuman* 165).

The newly printed object is indeed derived from the previous one; they have a connection, but the former is a transduction of the latter, that is, a kind of translation (an object, an image, patterns, data, a description) that moves from one state to the next while it maintains traces of its previous stages, simultaneously shifting away from the original because it operates on the individuation of the object itself. In other words, it operates on its progressive material production through a replicating machine. Deep Matter replays Eric Drexler's "grey goo" theory from *Engines of Creation* (1986), in which self-replicating machines lose control and consume all of earth's resources at an exponential rate. This theory, originating with John von Neumann, seems to be consubstantial with cybernetics and the fate of information technology.

This loop that deviates from itself, as an intensive repetition that produces a difference, is found not only on the macroscopic level of anthropotechnology, but also at the microscopic level of the software. While Deep Dream attempts to recognize motifs in an image, it also introduces feedback since, at every iteration, it puts what it sees in the image. If it recognizes a dog, it gradually makes it appear: "Whatever you see there, I want more of it!" (Mordvintsev et al.) The variability of the digital im-

age, our ability to modify a file without having to change it, introduces a hallucinatory and super-interpretive mutability. It is because the software sees dogs that they appear in front of us, in the same way we notice the "mistakes" made by *Deep Matter*. With artificial intelligence, the point is not to ascribe intelligence to a machine (or to a human being), but merely to observe it in a relational game between the two. This relationality is the possible. Through a metaphorical and operational use of computer science as an image of mental processes, neuroscience inevitably produces what it promises.

In the same way that a network of neurons hallucinates pizzas, mollusks and dogs, we hallucinate techno-science in our "own" brain. The interlacing of a dream with another dream, the lucid dream without end that lets us fall infinitely because the ground no longer exists, has an affinity to the interlacing of (neuro)science and the imaginary. We look at the 3D printer, which over- interprets an object that it is printing, in the same way that we look at visitors in a museum who are fascinated by the artwork. We silently tell ourselves that there must be someone behind us who is looking at us looking at them. We don't look back because we are afraid to face the void. This is what our deepest dreams are made of. The computer keyboard is beneath our fingers; we type away and each of our keystrokes is registered on the Web as if we existed outside the machine.

Notes

1. The occurrences of lucid dreaming and certain forms of somnambulism that form the storyline of the film *The Machinist* (2004), do not contradict this anachronism in the sense that, according to the point of view that we adopt, there is little in common with the normal experience of a dream and should be considered according to another typology.
2. Werner Herzog, *The Cave of Forgotten Dreams* (2010)
3. Turner et al. has shown how a part of the American counter-culture of the 1960s was transferred to the economy of Silicon Valley, accounting for the recurrence of references to psychedelic hallucinations in the field of AI and virtual reality since the end of the 1980s.
4. Radio broadcast transcribed in Copeland.
5. Here I refer to a conference by Quentin Meillassoux to develop a hypothesis on computer code.

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