Chapter

Analog, Embodiment, and Freedom

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Abstract

Discussions of computer technology often touch on matters of free will. Can living organisms, especially human beings, be interpreted as like computers? Much writing on computers today assumes that digital technology shows freedom of the will is illusory. Charles S. Peirce (1839-1914) had quite a bit to say about the freedom of the will and its relation to the laws of nature. This chapter provides evidence from a number of writers on computers and related matters which bears on his analysis. Peirce's category of Firstness has a great deal to contribute to our understanding of freedom as well as human responsibility, but its true meaning requires quite a bit of explanation.

Keywords: computers, analog, digital, freedom, determinism, semiotics, esthetics, embodiment, algorithms, addiction

1. Introduction

Lots of evidence has accumulated that online content influences people. It has even been pointed out that computer algorithms sometimes know us better than we know ourselves. They can detect our interests by the searches we do and the web pages we open. If this were not so, businesses would not advertise on the Web. But does that mean we humans are just a slower, less systematic kind of computer? How different are computers and living organisms?

Peirce's most difficult category is Firstness. It is difficult because it is about things before we really begin to think about them or even recognize their "otherness." Secondness, which consists in that otherness, and Thirdness, which contains our categorizations or general conceptions of things, are fairly straightforward. In Peirce's categorical system Firstness lies at the base of Secondness and Thirdness. Before anything is different or general, it is itself.

There is an enlightening passage where Peirce lays out the relation of Secondness to Thirdness:

> *I should not wonder if somebody were to suggest that perhaps the idea of a law is essential to the idea of one thing acting upon another. But surely that would be the most untenable suggestion in the world considering that there is no one who after lifelong discipline in looking at things from the necessitarian point of view has ever been able to train himself to dismiss the idea that he can perform any specifiable act of the will. It is one of the most singular instances of how a preconceived theory will blind a man to facts that many necessitarians seem to think that nobody really believes in the freedom of the will, the fact being that he himself believes in it when*

> *he is not theorizing. However, I do not think it worthwhile to quarrel about that. Have your necessitarianism if you approve of it; but I still think you must admit that no law of nature makes a stone fall, or a Leyden jar to discharge, or a steam engine to work. ([1], pp. 89-90)*

Here he is arguing against the popular "necessitarianism" of his day, which we generally call "determinism" in English today. Its claim is that every single fact of our experience is determined by natural laws. If you know the state of facts at any time, you can deduce what the facts will be at any other time by those laws ([1], p. 325). Peirce says this implies there is no real increase in diversity in the world. Whatever diversity exists today would have existed at the beginning of the universe. Natural processes only rearrange things; they do not create anything new ([1], pp. 334-335).

Now, actually, there are several objections one could make to the passage. The most obvious is that, of course, stones do fall because there is a law of nature, gravitation. What Peirce is saying is that when a stone falls, some other single entity, such as perhaps my foot hitting it, is the occasion for that law to operate. That is Secondness. He is arguing that my foot hitting the stone is not predictable by that or any other law.

A more difficult problem is his statement that no one can "train himself" to believe he cannot make certain choices. It seems people often do train themselves to believe that. In fact, maybe that is what depression consists in, the belief you cannot do things you would like to do. But I believe Peirce is speaking here in a more "ideal," philosophical sense: does the philosopher really believe he cannot make choices?

2. Wilden on computer technology

How we understand the human brain has important implications for the freedom of the will. In a 1972 piece, Anthony Wilden lays out a distinction between "analog and digital communication" ([2], pp. 155-195). Wilden is attempting to show what elements of electronic technology may correspond to the nervous systems of organisms, and his discussion of analog and digital brings out some interesting parallels. He says our nervous system includes both analog and digital elements, laying out in detail how nerve axons transmit messages to the synaptic connections between cells. The transmission is at first an analog one, meaning that it is about "difference" on a continuous scale. Eventually the message passed in the axon reaches a certain "threshold," and it becomes a matter of "opposition" rather than difference ([2], pp. 174-176). This is now a digital message. Wilden points out that genes are digitally coded but depend upon related enzymes, which are analog elements ([2], p. 158). Digitalization is always necessary whenever an important "boundary" or "frame" needs to be added to an analog continuum. As Wilden puts it:

> *[The organism] introduces a desired closure into a continuum, which distinguishes a certain "part," and by the same act constitutes himself as distinct in some way from the environment he perceives ([2], p. 174).*

The digital splits the world into discrete elements and helps us experience our individuality. The connection of this concept to Secondness is clear.

In another chapter of the same book, he suggests the analog may correspond to Peirce's Thirdness, but he admits he does not understand Peirce's categories very

well [3]. He suggests Firstness is the Real and Secondness, the Imaginary. This misconstrues them. Something imaginary is a Second when we find out it is imaginary; until then, it is an aspect of our freedom, which is Firstness. As Peirce would put it, Firstness is the "monadic" aspect of our experience. He says:

> *I can imagine a consciousness whose whole life, alike when wide awake and when drowsy or dreaming, should consist of nothing at all but a violet color or a stink of rotten cabbage. It is purely a question of what I can imagine and not of what psychological laws permit ([1], p. 81).*

Consciousness has this monadic aspect that is complete unto itself and not dependent on anything external. Firstness is predominant in the ideas of "freshness, life, freedom" as well as feeling, as opposed to perception, will, and thought ([1], pp. 78-79). When we find out something is imaginary, we are essentially acknowledging a dyadic relation, a relation between what something is and what it is not (Secondness). There is also an element of Thirdness that comes into this, in that becoming convinced something is not real is coming to a sense of the persistence or stability of that reality ([1], p. 247). That is a triadic relation, because it involves a sense of connecting links between things, things yet to come as well as in the past. It is saying, "I will not see evidence of it in the future." Thirdness has a necessary connection to future time. For example, evolution is Thirdness because it is the emergence of things in time. Education is Thirdness because it means becoming aware of more things and different categories of things.

3. Pre-Wilden views of analog and digital

Wilden cites John von Neumann's classic work *The Computer and the Brain* ([2], pp. 157-158). Von Neumann talked about analog and digital computers but did not interpret human cognition in terms of the analog. Analog computers work by representing numbers by units of actual physical quantities, while digital machines represent them "as in conventional writing or printing, i.e. as a sequence of decimal digits" ([4], pp. 3, 6). He thought our cognition was basically digital with some analog features ([4], p. 58). He emphasized the binary nature of nerve impulses. They were basically "on–off switches," and he put less emphasis on the threshold features Wilden emphasized ([4], pp. 40-44). What is "non-digital-like" in our brains is the result of their working statistically rather than analogically. If we imagine computing machines to have existed prior to the human brain, we might say the brain gave up precision in arithmetic to gain "an improvement in logics" ([4], p. 80). The nervous system uses two types of communication, the "non-arithmetical" and the "arithmetical." The latter includes "communications of orders," which are logical. Our nervous systems require less "logical depth" than digital computers, so statistical information is adequate ([4], pp. 76-82).

Hubert L. Dreyfus conceptualized human cognition in terms of the analog in his 1965 book *Alchemy and Artificial Intelligence* but appears to have given up that understanding in his later work *On the Internet* (2009). In the first work, he lays out three areas that digital computers are unable to handle: fringe consciousness, essence/accident discrimination, and ambiguity tolerance [5]. Dreyfus's conception of the analog appears to have influenced Wilden ([2], p. 157). One problem he lays out in some detail is language processing. It is difficult to understand language as simply a list of words in sentences constructed by rules. Dreyfus cites Wittgenstein on how our understanding of language appears to be inseparably connected to the way we live. Our lives provide us with the context that makes words and sentences

understandable ([6], p. 33). This is an example of "tacit" knowledge and ambiguity tolerance. He cites Bar-Hillel for the view that machines can only make good translations of language if they can learn ([6], p. 35).

Dreyfus quotes a statement by Bullock on "graded synaptic potential," similar to Wilden's "threshold effects," arguing that the nervous system is a "complex analog device" rather than digital ([6], p. 56). He goes on to speculate on "wet" computers that simulate the way the human brain works, perhaps taking the form of an analog computer using ion solutions whose electrical properties change to model relationships. However, he cites Maurice Merleau-Ponty for doubts this would be adequate, since the human body as a whole plays an important role in facilitating intelligent behavior ([6], p. 59). This is the primary theme of Dreyfus's later work, *On the Internet*.

4. Post-Wilden views of analog and digital

Dreyfus has made an ongoing effort to monitor the progress of Artificial Intelligence and appears to make an effort to evaluate it as generously as possible. For example, he admits the development of Google, with its weighting of web pages by their apparent importance to searchers, shows some of his skepticism was excessive ([7], pp. 21-24). Google shows a computer can get a sort of indirect knowledge of what web pages are about without really understanding them ([7], p. 22). If a lot of searchers have shown interest in a page, that indicates something about its content. However, it says nothing about the *correctness* of the content. The interest of people in a page may be due to irrational factors or manipulation by the publisher.

Dreyfus says the big problem with AI is the computer's lack of "embodiment." Humans have common sense, and this is inextricably tied to our having bodies ([7], pp. 18-20). This appears to have replaced the concept of the "analog" for him. After all, analog computers are just another kind of machine. As Von Neumann showed, analog computers are used to do arithmetic ([4], p. 3). They are really just a different way to represent quantities. Our common sense comes from our not being machines.

However, there may be another sense in which the analog is relevant. Wilden pointed out that the human programmer provides a "necessary analog component to complement the amazing brute-force problem-solving capabilities of the digital computer" ([2], p. 157). Computers operate on codes, and a code as a whole is an analog of something. It is a way to get computers, with their ones and zeroes which are mostly meaningless to us, to do useful work by modeling some human activity such as writing or playing games. Von Neumann showed that digital computers have this power because they have memory ([4], pp. 19-20). This allows them to do things besides arithmetic. The programmer can instruct the computer to transform its numerical memory into something non-numerical. Nonetheless, one can argue the computer has no knowledge of the world. It is primarily a kind of mental prosthesis that allows us to perform certain functions faster and more accurately.

There is a connection between this and Peirce's semiotic theory. The computer code functions as a kind of "icon," in that its relation to a human cognitive activity is one of similarity ([1], p. 102). The skill of the programmer consists in her ability to make the program as analogous to the human activity as possible, while making sure the computer is consistently able to perform the actions. When she does not do a good enough job, the program, and perhaps the computer as a whole, "crashes."

In the book, Dreyfus makes a contrast between Plato, who pushed a "disembodied" conception of human personality, and Nietzsche, who emphasized our embodiment ([7], p. 5). Dreyfus is particularly doubtful about the efficacy of

distance learning. He goes through the stages of learning from the novice, the advanced beginner, competence, proficiency, expertise and, finally, mastery and shows how the body and emotion are increasingly necessary as one progresses up the scale. Have not the Stoics and Descartes taught us that we make the most progress without emotion? ([7], p. 32) Dreyfus argues that learning above the stage of novice requires a level of emotion. We must want to succeed and worry about not measuring up. The teacher provides a model of commitment, and if we are not physically present with him or her, we lack the cues necessary for progress:

> *If the teacher is detached and computer-like, the students will be too. Conversely, if the teacher shows his involvement in the way he pursues the truth, considers daring hypotheses and interpretations, is open to students' suggestions and objections, and emotionally dwells on the choices that have led him to his conclusions and actions, the students will be more likely to let their own successes and failures matter to them ([7], p. 33).*

In a 2018 article, Beatrice Fazi attempts to build on the work of Gilles Deleuze to create a "digital esthetics" [8]. While Deleuze did not talk about computers very much, his work implied that the digital could not participate in the esthetic or creativity, central aspects of his philosophy. Digital computers depend on discreteness, on determinacy, but for Deleuze, indeterminacy was essential to life. Is there any way the digital can play a role in creativity? She surveys some attempts to make computers "creativity and esthetics friendly." One approach is to link the operation of the computer to the lived experience of users ("embedded computing"). This provides an "analog" or "embodied" supplement to the computer's cold, digital operation. Anna Munster made a particularly vivid attempt at this by emphasizing that the analog and the digital that come together in human-computer interaction are "more than the sum of their parts" ([8], pp. 12-13). Humans and computers working together have the potential to produce novel elements neither could produce on their own.

Fazi is not entirely satisfied with this solution. It is problematic because it ties the value of the digital to the analog (or embodied) elements, and she wants to believe the digital, or more precisely the computational, is valuable in itself. She calls her desired conception a "computational esthetics." This must go beyond "the discrete features of digital technologies, such as digits and pixels" to include also the "finite steps that characterize computation as an axiomatic and algorithmic method" ([8], p. 16). She discusses the work of Alan Turing in formalizing the nature of computing processes. He showed they work via precise, finite routines, but also that certain problems could not be solved in this way. They are "incomputable" because the steps they require are infinite ([8], p. 21). Gödel's Theorem showed that the computational depends ultimately on formal axioms arising from indeterminacy, since they cannot be deduced from the formal system themselves ([8], p. 20). Thus Fazi ends with a computational esthetics broadly compatible with Deleuze. The computational is valuable for its "systematizing and rationalizing logical capacity" ([8], p. 16) while not undermining indeterminacy and freedom.

5. The second cognitive revolution

A development bearing on all these questions is what has been called "the Second Cognitive Revolution." Dreyfus was an important person in the history of this movement [9]. Rom Harré has summarized the direction of the movement by saying the earlier Cognitive Revolution was too focused on cognition as governed by

formal rules and schemata. It had been an advancement over earlier understandings which interpreted the mind as simply receiving external stimuli passively. We do not just respond to our environment; we also have complex "representations" of it. The movement drew on the work of Turing to conceive of the brain as an "information processing device" ([10], p. 181). It was primarily digital in nature since digital computers contain representations of the world in their memories. By the mid-80's, it was clear that a more subtle understanding of language was necessary to really understand human cognition. This involved rejecting the whole Cartesian model of thought as something internal and seeing how it functions within life as a whole, especially in its social aspects. Ludwig Wittgenstein had a major role here with his concept of "language games," of language as a sort of set of recipes rather than formalizable rules. As Harré points out, the First Cognitive Revolution had been too trapped in "the presumptions of individualism" ([10], p. 181). In fact, social cognitive processes precede individual ones.

In Dreyfus's contribution to the same volume, he argues against the concept of representation altogether ([11], pp. 39-73). Drawing on the work of Walter Freeman, he argues for what he calls a "Heideggerian" or "Merleau-Pontian" artificial intelligence ([11], p. 58) to solve the "frame problem." Both machines and living organisms encounter facts in the world, but the frame problem asks how a machine might be programmed so it can assign significance to novel facts. As he puts it, speaking of a closely related "binding problem":

> *How can the brain keep track of which facts in its representation of the current world are relevant to which other facts? ... [A]s long as the mind/brain is thought of as passively receiving meaningless inputs that need to have significance and relevance added to them, the binding problem has remained unsolved and is almost certainly unsolvable ([11], p. 59).*

Drawing on Freeman's work with rabbits, Dreyfus, in line with his emphasis on embodiment, argues that organisms select relevant elements in the world based upon their prior experiences and purposes (feeding, defense, reproduction, etc.). He lays out Freeman's analysis of how "cell assemblies" in the animal are activated by sensory stimuli such as smell. These assemblies are self-organizing, bringing together different parts of the animal's brain and body, not just passive receptors but directed by its active concerns. Drawing on Merleau-Ponty, he calls the interaction of the organism's nervous system and the environment "basins of attraction" ([11], p. 62). The binding problem is simply a result of trying to interpret the animal from the researcher's perspective rather than that of the animal ([11], p. 61). He suggests machines might be designed to function the same way ([11], pp. 68-73).

In the following chapter of the volume, H.M. Collins raises some serious problems with Dreyfus's proposal [12]. The difficulty is that it does not explain what is unique about humans. As Terrence Deacon argued in his *Symbolic Species* [13], symbolization is what is distinctive to humans. We share with animals an immediate "indexical" (in Peirce's terms) engagement with items in our environment (Seconds), but since we also use "symbols" (in Peirce's sense), involving conventional (shared) signifiers for general aspects of the world (Thirds), an element of representation seems inherent to our cognition. It would seem, in fact, that this symbolic element must be "digital" in Wilden's sense, in that it provides a stable, discrete representation of general aspects of the world while permitting us also to speak of particular things and persons (Seconds) and feelings and esthetic qualities (Firsts). As Peirce would say, it is only because we use the lower "iconic" and "indexical" forms of signs that symbols emerge as possible ([1], p. 115). The

meaningfulness of symbols stands on their foundation. Peirce's pragmatic theory of meaning analyzes the meaning of concepts as generalizations of expected experience, which would have to take the form of indexes and icons ([1], 272-273. There Peirce seems to deny the iconic element, but if we understand the relationship between indexes and icons in his understanding, an iconic element is inseparable from indexes).

So where does that leave Wittgenstein's conception of language as a collection of recipes, inextricably linked to our "embodied" ways of living? In reality, Peirce's theory is very close to it. Words are only meaningful to the extent we have "interpretants" for them, which are our habitual and fallible ways of seeing things as we consider signs [14].

6. Implications for free will

Another contribution in the same volume is "The Illusion of Free Will and its Acceptance" by Giuseppe Trautteur ([15], pp. 191-203). The purpose of the article is argue for what he calls "double feel" ([15], p. 199), the apparent truth that people can be both convinced that they have free choice and realize theoretically that there is no evidence for free will. He talks at length about the scientific evidence for free will and concludes it is not there. He even cites the experiments published by Kornhuber and Deecke which showed that neural commands initiating action precede our conscious awareness of making decisions ([15], p. 194). While he is aware of the indeterminacy of microscopic quantum events, he is convinced that macroscopic events are strictly determined by natural law ([15], p. 193).

Trautteur expresses a great deal of sorrow about this and says it cannot help but undermine ethics and religion ([15], p. 200). Why are we creatures that seem to insist on this illusion? Trautteur entertains the proposals of Clore and Damasio that we are born with "markers" for "cognitive feelings" such as the sense of volition ([15], p. 198).

To respond to this I would like to go back to something I mentioned at the beginning. Peirce criticized necessitarianism for denying that there is any increase in diversity in nature. Natural laws just rearrange the preexisting diversity. He thought this idea was intolerable for any view of the world that attempted to understand creativity in any sense. Firstness is manifested in the variety of the world, and perhaps one could even argue that "internet addiction" is somehow dependent on it. To borrow a phrase from Dreyfus, a person addicted to online content is not "detached and computer-like" ([7], p. 33). Our ability to get addicted appears to depend on computers showing us interesting things, and this depends on diversity. Without Firstness, the internet would be a bore. Especially with the development of the World Wide Web, digital computers can convey analog information like sights and sounds. They are not just for number crunching or word processing.

Peirce's theory was that lawfulness (Thirdness) was growing in the universe. As he says:

> *At present, the course of events is approximately determined by law. In the past that approximation was less perfect; in the future it will be more perfect. The tendency to obey laws has always been and always will be growing. ([1], p. 358).*

Perhaps we can move away from a focus on proving what determines each of our actions and consider the possibility that creativity itself is the best evidence of indeterminacy. Purely "free" choices do not have to happen constantly as long as they *can* happen at times.

7. Computer algorithms and determinism: a case study

In a July 7, 2019 article in the *New York Times,* Patrick Berlinquette writes of his experiences using "The Redirect Method," a program targeting Google searchers with ads to influence searchers' behavior [16]. He acknowledges that marketers like himself profit by "exploiting impatience and impulsiveness," but he wants to show online ads can do positive things, too. "Redirect" gives counter-messages to a person's apparent interests. Berlinquette experimented on influencing two groups of troubled people, those who were suicidal and those who might become mass shooters. He was helped in setting up the programs by the experience of the National Suicide Prevention Lifeline and the Redirect Method's experiences reaching out to ISIS sympathizers. The ISIS campaign provided Google with a blueprint that shows, step by step, how to create redirect ads to influence people. Google has a suicide algorithm, but it has gaps he attempted to fill. He says he would measure the success of his algorithm by how many people clicked on his ad and called the number on his web site, linked to the national helpline. There was a similar link for people who seemed interested in perpetrating shootings.

He was quite successful with suicidal people but not with shooters. With the first, the "conversion rate," the rate of people responding, was 28% compared with the usual Google rate of 4%. With shooters, the success rate was low, though he does not give an exact percentage. Why would the success rate be different for the two groups? My guess is that it is not due to some flaw in his mass shooter algorithm, but because the desires of the two groups are different. Suicidal people usually want help. If someone reaches out, they will respond. People considering mass murders are not interested in talking to anyone, or at least the chance of their wanting to is much less. The explanation lies in their inner desires rather than some external manipulation. In Peirce's terms, it is Firstness, not Secondness or Thirdness.

8. Conclusion

The 1975 film *The Stepford Wives* depicts a wealthy suburb of New York, Stepford, where wives appear to be unnaturally obedient to their husbands [17]. One wife moves to Stepford with her husband and gets progressively more worried the longer she is there. Every now and then, one of her friends suddenly changes to this unnaturally "submissive" personality. While it is a horror film, it's difficult not to laugh when the women suddenly change. In real life, no one changes that way, even gradually.

I believe the analyses laid out by Peirce, Wilden, Deleuze, and Fazi make it highly doubtful computers can actually change our values. The most they can do is take advantage of desires we already have. Under their influence, we will do some things we would not otherwise have done, but our basic personal orientations will remain intact.

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