

Title: "I didn't write this paper, my computer did."

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Abstract:

This paper presents the very contentious idea, which is obviously at first thought wrong, that thinking is the product of technology, and not that thinking created technology. That Human Intelligence was not only artificial from 'the get go', that it isn't intelligent at all as it is a determined effect of technology and its algorithms. The truth or not of this idea plays a secondary role to the idea of thinking the unthinkable.

Key Words: Artificial Intelligence, Technology, Art, History, Culture.

Introduction:

We are all aware of science fictions such as The Matrix or Terminator series which see mankind's intellectual and physical powers overcome by AI in some future Apocalypse. I will argue this has in fact already occurred and did so millions if not billions of years ago.

I will begin by outlining three reasons why one might consider that it was technology which created human intelligence, its history, cultures in all the various forms, its religions and sciences and even any and all understanding. I will then briefly develop each as arguments within the space constraints. The idea of such a consideration is premised not on any proof, but on the exercise of thinking the unthinkable. The three reasons will be epistemological, ontological, and historical. Notwithstanding these, such an idea, that **'We are the product of technology and not the producers of technology'** has a shared pedigree with much so called 'human' thinking. This very 'shape' of human thought was created by the 'shape' of technology¹. A feature of this has been successive overturning of paradigms, from the idea of a flat earth, to a spherical earth centred universe, through to heliocentricity, elliptical orbits to the present cosmological model. Each paradigm shift tended to be a reversal of the prior. A technological basis for thought is then such a reversal as it is opposed to the idea that determined thinking is responsible for technology. This in no way supports the arguments to be made, as any contentious theories, from Aliens, Computer simulations to Brains in Vats are likewise an alternative. What they do from that perspective, is just that, regard this reality from another viewpoint. Which in itself might be interesting.

So here is my Copernican² move. Maybe thought itself was the product of technology, thought was the product of an object, and I don't mean the human brain. I mean the 'revolutionary' idea that 'technology' created the thinking brain and not the usual idea that it is thinking that creates technology. This seems a ridiculous idea, and it wasn't even my idea. It has the qualities of the Copernican move of reversal, it has the theme of the seemingly absurd ideas generated by 'death of'.. in the line of 'Death of'... of the Author... Art, The Novel... Humanity.. and other seeming absurdities found in Post-Modernism where the normal direction or situation is reversed - a 'death' of thinking needed to understand the origin of the creative thought... It seems the ability to think as we do came from a basic technology which we certainly didn't invent and was more likely accidental...

"Gorillas, orangutans and chimpanzees maxed out their calories with various combinations of big, strong bodies and brains containing 20 to 40 billion neurons. Those brains consume around 9 percent of the total calories that they burn – which means they must spend up to eight hours a day foraging. Humans, in contrast, sport brains packed with 86 billion neurons- and we devote a whopping 20 percent of our calories to feeding our heads. We can afford such extravagant caloric luxury, Herculano-Houzel believes, only because our species developed a unique technology: the cooking fire. Around 1.5 million years ago our ancestors began using fire to transform food. "That allows a jump in the amount of calories that you can get from your food that no other practice can achieve," Herculano-Houzel says. Cooking makes it easier to digest plant foods and to extract calorie-dense fat from animal carcasses- for example by stewing bones to extract marrow... around the time our human ancestors conquered fire, they also finally broke through the caloric barrier and jumped from brains of perhaps 40 billion brain neurons (Homo habilis) to 60 billion neurons (Homo erectus), and finally to 86 billion. Were it not for cooking, she says "we would not be here"."³

So the idea of intelligence creating technology is just an illusion. An object or thing - fire – made 'cooking' which in turn made intelligence. Objects came first, and hindsight hides this event. It is maybe difficult to accept this, even in the quote the ghost of 'thinking first' is present "our species developed a unique technology:" – but the facts run counter to that, the ability to

1 In Biology this technology is called evolution.

2 I'm using 'Copernican' not in the original astronomy of Copernicus, but in Kant's famous use of the term, and what caused him to wake from his 'dogmatic slumber' which was not his own thought but that of another's – Hume. And I will maintain that Hume's thoughts were likewise not his own, and that the causal chain runs back through time to the origin of thinking.

3 Scientific American Volume 24, Number 4, Winter 2015 p. 111.

develop technology can't come before the big brain. And here are the two origins of my three arguments. Firstly historical, and I will develop this latter, but also the more philosophically challenging one of an origin. The origin of thought 'knowing', an epistemological problem.

An epistemological problem:

I use 'challenging' for good reason for the two philosophies which highlight this 'chicken and egg' scenario are the latter work of Wittgenstein, his 'Philosophical Investigations' and Hegel's 'Science of Logic'. Obviously I'm not going to elaborate these here in a short paper, but they do present powerful arguments against the idea, ideology even, of the development of technology as an evolutionary and teleological human determined process. So here I face the daunting prospect of challenging the idea of this incremental progress, surely modern technology simply **IS** better than the previous⁴. Yet such an idea is similar to some creationist myths – notably 'turtles all the way down'⁵. That intelligence or learning is an incremental and purposeful process. This is it seems 'a given'. Yet it is not able to provide itself with any origin. And therefore can not represent the whole of the situation in which we are. At best it becomes an elaboration on some other more fundamental process.

The opening of Wittgenstein's 'Philosophical Investigation's'⁶ begins with a long quote from Saint Augustine on how he learnt the names of objects. This seems perfectly reasonable and in-line with the conventional ideas of learning I refer to above, a child is shown an object, say an apple, and the word 'apple' is repeated until the child learns what an 'apple' is. "I gradually learnt to understand what objects they [the words] signified; and after I had trained my mouth to form these signs, I used them to express my own desires"⁷ Wittgenstein then goes on in some detail over many pages to show how this 'reasonable' explanation is not reasonable at all. In short 'how does the boy know how to apply the term apple, or red, when presented with an object'. Simply put, in order to understand a word, I need to understand it first. It may well be argued that we learn by substitution, so I learn from **already** knowing what a 'doggy' is, to knowing what a 'Dog' is, to knowing what a 'Canis lupus familiaris' is. But have I learnt anything? Yes, and no. I've learnt that Dog is a word which means the same as Canis lupus familiaris, and the same as 'doggy', but this is an example of A priori learning. I've learnt the words mean the same, like Husbands are non bachelors. But I've learnt nothing new about dogs or the outside world. Without a 'bootstrap' word, in this case 'doggy' I couldn't learn the other meanings. And so the idea of learning like this will not do without some prior foundation. As if I need some prior term as a given label for a dog. I need to already **know** the thing which I can then associate with the sound 'Dog'. So such an Augustinian model of learning is not real learning, but a process of translation from some internal already given 'idea' of a 'thing' to what is labelled 'dog'. So without already knowing what a dog is I could not learn what a dog is – that the word 'dog' should be applied to this object can only be successful if I already had knowledge of what a 'Dog', 'Canis lupus familiaris' or in the first instance a 'doggy'⁸ is.

From this gross simplistic account of Wittgenstein's I'll now move on to Hegel! The beginning of his 'The Science of Logic'⁹ preoccupies itself with how to begin. "With what must the science begin"¹⁰ Not surprisingly for anyone who has read any Hegel this is not a simple question. And again I must take an exceptional liberty with the text¹¹. The problem is that the science must be self determining, i.e. not founded on something other, or determined by anything other. It must, to be a science, first establish its subject, unlike other sciences which have a prior given subject¹². The upshot is that the ground of Hegel's logic is *groundless*, of necessity. And can be nothing else in order to be self determining. The difficulty one may have with this may or may not be helped by seeing that the dialectic of Hegel, in The Logic, is one which has no beginning or end. It begins with absolute Being (and absolute nothing) from which the text develops towards an eventual Absolute Idea, and what is this? - "the absolute Idea alone is being"¹³. This thinking in a way gets around Wittgenstein's problem of how we begin to learn. There simply isn't a beginning. And so we acquire nothing new from somewhere. Hegel's logic does not depend on anything exterior to it.

4 I'm reminded of the only poem I fully know by heart,

"I am a sundial and I make a botch
of what is done far better by a watch" - Hilaire Belloc.

5 See https://en.wikipedia.org/wiki/Turtles_all_the_way_down.

6 Philosophical Investigations, Ludwig Wittgenstein, G.E.M. Anscombe (Translator), Published January 15th 2001, Blackwell Publishing, Inc. (first published 1953).

7 Ibid. p.2e.

8 One can imagine the child learning 'doggy' only by applying it to an object she already had knowledge of.

9 The Science of Logic, G. W. Hegel, Routledge, 1969.

10 This is an opening chapter, p.67.

11 I recommend anyone interested to read The Opening of Hegel's Logic by Stephen Houlgate (Purdue University Press, 2006) over 400 pages, of which the first 190 gets us over 'how to begin!' Hegel himself in The Logic (p 29) states that it is "the first sequel to the Phenomenology of Spirit", itself over 490 pages of dense material. Though this text does not provide any basis for The Logic. Rather it arrives at an Absolute Knowing – essentially empty of content!

12 A naive argument might be that 'logic' has a subject, in the manipulation of signs using rules. This is 'formal' logic and is dismissed by Hegel whose logic is philosophical. It can – unlike formal logic – accept no axioms. It must generate everything itself.

13 Ibid. p. 824.

There is a third philosophical idea which will segue me to the next theme, that of Nietzsche's 'The Eternal Return of the Same'. Again briefly, if one thinks about this, the idea of invention ceases to be anything new. Any 'invention' any technology, occurred infinitely times in the past and will occur infinitely times in the future. Therefore to say that there is a causal link from now to the future which has direction would be false. For in this world view far into the future will re occur all history including yesterday. And this idea of a repeating history is not confined to speculative philosophy or certain religions, such ideas are now appearing in mathematics and physics¹⁴.

To conclude this section, the idea of technological progress, human and machine learning of the naïve type of incremental learning outlined above is questionable as it fails to account for its origin. The other 'philosophical' idea is that of the algorithm itself as the product of learning and as capable of learning. This I call an ontological argument.

An ontological argument:

There are given limits to the possible number of states that any finite system can have.

Again I must apologise for being brief and resorting to Wikipedia-

“In physics, the Bekenstein bound is an upper limit on the entropy S , or information I , that can be contained within a given finite region of space which has a finite amount of energy—or conversely, the maximum amount of information required to perfectly describe a given physical system down to the quantum level. It implies that the information of a physical system, or the information necessary to perfectly describe that system, must be finite if the region of space and the energy is finite. In computer science, this implies that there is a maximum information-processing rate (Bremermann's limit) for a physical system that has a finite size and energy, and that a Turing machine with finite physical dimensions and unbounded memory is not physically possible.”¹⁵

This somewhat abstract idea actually also poses a challenge to the developmental ideas in human evolution including technology. Let me use another example, 'A two Bit Universe'.

In a two bit universe we have 4 possible states.

00
01
10
11

Likewise as we increase the 'size' of our universe we have more possible states. 3 bits gives us 8 possible states, 4, 16 states. States or objects, things, data, numbers, operations, Algorithms. So given a finite set of possible states there is a finite set of 'things'. This idea is nothing new, and it has a close association with ideas such as those of 'The Library of Babel' of Jorge Luis Borges¹⁶. Here the imaginary library conceived of as a universe containing all possible 410-page books of a certain format and character set. The order and content of the books are random though the inhabitants believe that the books contain every possible ordering of just 25 basic characters, 22 letters, the period, the comma, and space. The subtle difference is that in any random library there does not follow that every possible sequence will be realized. And if the limitation of finitude is ignored we get into even deeper metaphysics of the infinite. Given infinity the 'possible' MUST occur, even the most remote of unlikely things.. (see Barrow footnote 14) but also there is the possibility of an infinity of repeating symbols. AAAAAAAAAA.... et al. Fortunately this needn't worry us here. The difference between a random arrangement and our two bit or any number of bits universes is that there is always a determined set of possible states, and no more or no less in our N bit universe. And these are given a priori. This is important. For a given computer there is a finite a priori number of states it can be in. Or better put, a finite, a priori number of programs, or algorithms. Once we set up the universe the possible states are a 'given'. A simple example in a game is tick tack toe (naughts and crosses) which has a finite number of 26,830 possible games in total as a product of its rules. By setting up the rules of the game, its 'axioms', all the possible games are effectively 'given'. Any 'surprises' in the game must therefore be a result of a human failure to see all the consequences already implicit given by the rules.

In our simple 2 bit universe it's clear that the pattern '01' is not 'invented', created, 'worked out', it is 'already there' as a consequence of there being 2 bits so 4 states. And adding more bits makes the consequences no less determined. Given N number of bits you have N^N number of possible things, no more, no less.

14 This is not a naïve as it might first sound. Again space prohibits but current ideas about multiverses capture this.

“This possibility is important, not so much because we can say what might happen when there is an infinite time in which it can happen, but because we can't. When there is an infinite time to wait then anything that can happen, eventually will happen. Worse (or better) than that, it will happen infinitely often.” J. D. Barrow, *The Book of Nothing* p.317, Jonathan Cape. 2000.

15 https://en.wikipedia.org/wiki/Bekenstein_bound, accessed 27/09/2018.

16 Borges, Jorge Luis. *The Total Library: Non-Fiction 1922–1986*. Allen Lane The Penguin Press, London, 2000. Pages 214–216. Translated by Eliot Weinberger.

0000000000000000
0000000000000001
0000000000000010
0000000000000011
.... etc.

So from this perspective any computer program is a realization of an already for certain possibility. There is a link here to the epistemology critique above, the child doesn't learn what 'dog' means but recognizes what was an already known object, 'doggy' to be one and the same. Which does seem very counter intuitive! No matter how smart the algorithm is, in effect it was 'already there'. If the algorithm is 'smart' it was either intrinsic – or Its 'smartness' comes from its recognition and so it use. But then in the latter case the act of creation wasn't the smart thing, but its application, and in the former, nothing was invented or created, it was in a sense already there, which again is a difficult idea.

So in this sense then its inherent 'smartness' was already there to be discovered. Now in discovery the thing impresses the discoverer, not the other way around as in the idea of humans making smart technology. These smart things, technology, in this case seems to have to be already 'out there' perhaps in some Platonic universe. And though Platonist ideals seem difficult to accept these days, they are common in mathematics, but also in game theory. So once the rules of a game are given, like the Axioms of Mathematics a set of all possible moves in effect exists as a virtual reality. If the non abstract 'real world' is like this then all its future objects, technologies in effect are already there/here as virtualities¹⁷

A posteriori evidence:

So we can now apply some a posteriori evidence from history to our themes above which point to problems associated with ideas of a causal development of human intelligence.

As we saw the large brain couldn't invent cooking which produced a large brain. Lets look at some other scenarios.

From the idea of early humans 'inventing' tools – the first technologies. We can imagine early man inventing tools, out of some need, just as we imagine inventing things like mobile (cell) phones out of a need. But is this the case? The desire for a bigger brain invented cooking is obviously impossible. So was it the desire for tools created the idea, of a given tool, which then looked for material? Or was it more likely this.

Someone watched a rock or log roll down a hill, or was playing with a rock, the rock had Harman's allure¹⁸ about it, and in playing with it, holding it they, and so we would also, discovered its smoothness, or better *it disclosed smoothness to us*, it disclosed its weight, its ability to roll, and if we held it and hit something or someone they went down like nine pins¹⁹. Or someone played with a stick, poked it in the ground, bent it and noticed its suppleness. The idea of poking something with it came from its pokability not from any idea of poking or the need to. From this tools for hunting, spit roasting etc. developed. Messing with slimy mud then feeling its malleability, its ability to hold water, accidentally burning it and seeing it change into something different. That seems more reasonable than deciding to 'fire' a clay pot. Metals like Bronze and Iron were not invented out of some need but discovered. Once the objects reveal their properties to humans, humans use them. We maybe thought we were smart at inventing spears and hammers, but we didn't invent rocks or sticks. Technology occurs by noticing the qualities of stuff in the first place, or better the stuff forcing, or persuading and charming us with its properties. OK once we get going and given the bigger brain we can get thinking, but the whole thing came from the objects which we then used. Right up to date, computers were never intended to write documents, design aircraft or share pornography. They were accounting machines, and the origin of that goes back to cards for weaving, and weaving through messing with the properties, being charmed by grasses and tufts of wool. We now know that the properties of objects can be useful, they taught us that, we go looking for them to solve problems, but even today objects do the work, they often push their properties on us when we were not looking for any particular solution. "John Bardeen and Walter Brattain at AT&T's Bell Labs in the United States performed experiments and observed that when two gold point contacts were applied to a crystal of germanium, a signal was produced with the output power greater than the input."²⁰ No one first wanted a non stick frying pan – or microwave oven. "PTFE was accidentally discovered in 1938 by Roy Plunkett."²¹ "in 1945 the specific heating effect of a high-power microwave beam was accidentally discovered by Percy Spencer, an American self-taught engineer from Howland, Maine. Employed by Raytheon at the time he noticed that microwaves from an active radar set he was working on started to melt a candy bar he had in his pocket."²² It's like the scene at the beginning of the Kubrick film '2001' where the Ape learns to use tools which result

17 There is in this a correlation with the ideas of Deleuze here on how actualities are associated with virtualities in a complex interplay. As well as some of Badiou's ideas relating to The Event.

18 This again is not in our scope and size restriction but the philosopher Graham Harman amongst others have postulated an flat ontology where the 'being' of objects is equal, a mountain is as much an object as a snow flake, the president of the United States or a unicorn. These objects have hidden properties and sensual properties. See Tool-Being: Heidegger and the Metaphysics of Objects, Graham Harman, Open Court Publishing, 2002.

19 In this case we have an answer to how we first knew what a dog was, who taught us this, a dog of course, it taught us what it was.

20 <https://en.wikipedia.org/wiki/Transistor> accessed 27/09/2018.

21 <https://en.wikipedia.org/wiki/Polytetrafluoroethylene> accessed 27/09/2018.

22 https://en.wikipedia.org/wiki/Microwave_oven accessed 27/09/2018.

eventually in manned space flight, only there is no black obelisk doing the teaching, the bone 'reveals' its sensuous properties to the ape, it's the bone not the obelisk Alien / God doing the teaching. It's quite funny to think of the science fiction of the Terminator and the Matrix, "the rise of the machines", the scary idea that technology will take over from humanity when in fact technology has been in charge right from the 'get go'.

So the idea of intelligence creating technology is just an illusion. This is far too much maybe for such a technological society... An 'object' – fire - made intelligence. And from this we can construct an 'alternative' history of human 'progress'.

Universities are technologies (objects) which create scientists, philosophers and Science, philosophical thinking, and all the other intellectual stuff, art, music ... literature... and now the newer technologies will create new art, philosophy and new societies, new people.

Although the 'Academy' can be claimed to be a human invention, Plato's, it was in turn a product of a city state which in turn a product of civilization.

The Plough made civilization possible... but we see that such tools are more discoveries of the properties of already existing things, like sticks and wild wheat, and a stone's abilities to grind...

Telescopes made Modern Astronomy and Astronomers... without the Santa Maria, Pinta & Nina no colonization of America...! ("the carrack was one of the most influential ship designs in history")... Evolution theory was made by HMS Beagle... The Steam Engine made Marx and Marxism.. The origins of computing in weaving, it's well known that the internet and world wide web were never 'invented' for their current uses. The same goes for much of the technology we think is invented for a reason. One of the major problems with software is just that, the C programming language was originally developed by Dennis Ritchie for his own use, so he never bothered to worry about someone other, a hacker, overflowing input data and so gaining control of the O.S. If we look at any history, we see technology doing the original work. (Ritchie wrote C in order to help write an operating system – Unix - for a computer his colleague Ken Thompson had found, or one which got his attention²³!)

Printing was responsible for the enlightenment, and new forms of literature like the Novel, amongst many other things. Trivially putting oil paint in tubes and the railway system together with a growing bourgeoisie 'caused' impressionism. Advances in technology of the valve gave new musical instruments which directly altered the development of western music. As did a range of other inventions or discoveries. Perhaps the greatest 'accident' was electricity, its properties to be discovered and not invented. It was already there!

The evidence becomes more apparent, the nature of communication is changed with email, text messaging alters language's structure and social media alters political and social systems. In every case the technology arrives first, and only then do we have the actuality.... of the current President of the United States, a product of Twitter!

And all the time a thin illusion is that we use the technology. Yet like playing any game we are bound by its rules and can only follow them, and can only produce and use these in ways already inherent in them. So...

Finally:

'We are the product of technology and not the producers of technology.'

So what are we to do if this is true?

Try to enjoy the ride!

A post script:

"Chicago Pile-1 (CP-1) was the world's first nuclear reactor. On 2 December 1942, the first human-made self-sustaining nuclear chain reaction was initiated in CP-1, during an experiment led by Enrico Fermi." (https://en.wikipedia.org/wiki/Chicago_Pile-1)

"Oklo [in Gabon on the west coast of Central Africa] is the only known location for this [natural nuclear fission reactor] in the world and consists of 6 sites at which self-sustaining nuclear fission reactions are thought to have taken place approximately 1.7 billion years ago, and ran for a few hundred thousand years, averaging probably less than 100 kW of thermal power during that time."(https://en.wikipedia.org/wiki/Natural_nuclear_fission_reactor)

23 "During the 1960s, Ritchie and Ken Thompson worked on the Multics operating system at Bell Labs. However, Bell Labs pulled out of the project in 1969. Thompson then found an old PDP-7 machine and developed his own application programs and operating system from scratch, aided by Ritchie and others." https://en.wikipedia.org/wiki/Dennis_Ritchie Accessed 28/09/2018.

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