

Article

Can Computers Become Conscious, an Essential Condition for the Singularity?

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Abstract: Given that consciousness is an essential ingredient for achieving Singularity, the notion that an Artificial General Intelligence device can exceed the intelligence of a human, namely, the question of whether a computer can achieve consciousness, is explored. Given that consciousness is being aware of one's perceptions and/or of one's thoughts, it is claimed that computers cannot experience consciousness. Given that it has no sensorium, it cannot have perceptions. In terms of being aware of its thoughts it is argued that being aware of one's thoughts is basically listening to one's own internal speech. A computer has no emotions, and hence, no desire to communicate, and without the ability, and/or desire to communicate, it has no internal voice to listen to and hence cannot be aware of its thoughts. In fact, it has no thoughts, because it has no sense of self and thinking is about preserving one's self. Emotions have a positive effect on the reasoning powers of humans, and therefore, the computer's lack of emotions is another reason for why computers could never achieve the level of intelligence that a human can, at least, at the current level of the development of computer technology.

Keywords: computers; consciousness; singularity; artificial general intelligence; intelligence; emotion; self

1. Introduction: Thinking, Language and Communication

Advocates of technological Singularity believe that through a process of iteration of artificial general intelligence (AGI), one day, an AGI device will design a computer or a robot with greater intelligence than it, and that the computer will do the same until a computer will be created with an intelligence greater than that of any human being. Because a robot is basically a computer with moving mechanical parts, the term computer is used henceforth to refer to both computers and robots.

In order for this Singularity to be achieved, the AGI device will have to achieve consciousness that includes being aware of what it knows. The purpose of this essay is to show that this is not possible, and hence, that the idea of Singularity is a pipe dream.

Before embarking on this quest, we want the reader to understand that a distinction will be made between the brain and the mind. All vertebrates have a brain, but humans are the only species that have a mind that evolved from their brain, which has the added features of verbal language, mathematical thinking, the ability to plan and the ability to conceive of things that are not immediately available in the here and now. Before humans achieved verbal language, their brain was basically a percept processor. With verbal language, the brain evolved into a mind capable of conceptual thinking. I believe that thought, language and communication are interconnected or hyperlinked. Many linguists regard language as the medium by which we communicate our thoughts. I believe that language is also the medium by which we formulate our conceptual thinking. I regard thinking as silent language and that language also has the additional feature of facilitating the communication of our thoughts.

The origins of speech and the human mind . . . emerged simultaneously as the bifurcation from percepts to concepts and a response to the chaos associated with the information overload that resulted from the increased complexity of hominid life. As our ancestors developed tool making, controlled fire, lived in larger social groups and engaged in large-scale coordinated hunting their brains could no longer cope with the richness of life solely on the basis of its perceptual sensorium and as a result a new level of order emerged in the form of conceptualization and speech. Speech arose simultaneously as a way to control information and as a medium for communication. Rather than regarding speech as vocalized thought one may just as well regard thought as silent speech. ([1], p. 5)

Concept-based language and thinking emerged because:

Percepts no longer had the richness or the variety with which to represent and model hominid experience once the new skills of hominids such as tool making, the control of fire and social organization were acquired. It was in this climate that speech emerged and the transition or bifurcation from perceptual thinking to conceptual thinking occurred. The initial concepts were, in fact, the very first words of spoken language. Each word served as a metaphor and strange attractor uniting all of the pre-existing percepts associated with that word in terms of a single word and, hence, a single concept. All of one's experiences and perceptions of water, the water we drink, bathe with, cook with, swim in, that falls as rain, that melts from snow, were all captured with a single word, water, which also represents the simple concept of water. ([1], p. 49)

Thinking, communicating and language form an emergent supervenient system for humans and would be a necessary attribute for any form of intelligence equal to or greater than that of human intelligence.

2. Perception-Based Versus Concept-Based Consciousness

Next, we turn to Ned Block's ([2], p. 227 and 230) observation that there are basically two levels of consciousness that he defined as *phenomenal* consciousness or p-consciousness and *access* consciousness or a-consciousness:

Phenomenal consciousness is experience; the phenomenally conscious aspect of a state is what it is like to be in that state. The mark of access consciousness [a-consciousness], by contrast, is availability for use in reasoning and rationally guiding speech and action.

P-conscious states are experiential, that is, a state is p-conscious if it has experiential properties. The totality of the experiential properties of a state are 'what it is like' to have it. Moving from synonyms to examples, we have p-conscious states when we see, hear, smell, taste, and have pains.

P-consciousness is perception-based and includes visual, auditory, olfactory, gustatory, tactile, pain, thermoperception, kinesthetic, chemical, magnetic, and equilibriception forms of consciousness. Each form of p-consciousness corresponds to its respective sensory channel or capability and hence is a perception-based consciousness. It is about perceiving or sensing signals either within the subject or those emanating from the environment or *umwelt* in which the subject operates.

A-consciousness, which is available for reasoning and rationality, is therefore concept-based as reasoning and rationality are concept-based mental activities. A-consciousness or access consciousness is therefore being aware of our thoughts and knowing what we know and hence entails listening to our silent speech. Unless we translate our percepts or the products of our p-consciousness into concepts or language they are not accessible "for use in reasoning and rationally guiding speech and action" and as such will not be part of our a-consciousness.

A-consciousness is closely tied to verbal language as described above. A-consciousness or concept-based consciousness is strictly restricted to human beings because we are the only organism capable of verbal language and hence conceptualization. A-consciousness is basically being aware of our thoughts and knowing what we know and hence is basically listening to ourselves silently talking to ourselves. With this in mind and for the purposes of this discussion I prefer to regard Block's a-consciousness as concept-based and p-consciousness as perception-based consciousness respectively.

3. Why It Is Impossible for a Computer to Possess Consciousness

We can immediately dismiss p- or perception-based consciousness as a possibility for computers as they have no nervous system and an integrated set of sense organs and therefore they cannot perceive at the level of a human. Let us therefore immediately consider whether it is possible for computers to possess a- or concept-based consciousness.

A- or concept-based consciousness, as I have claimed, is being aware of one's thoughts and therefore is basically listening to one's own internal speech. But to have internal speech one must possess external speech, and that requires having a desire or a purpose to communicate. Wanting to communicate, in turn, requires being aware of other intelligences and having a desire to communicate with them with language at least at the level of human language. But the desire to communicate grows out of social needs that requires having emotions of which the computers have none. Emotions arise from the physical interactions of a living organism initiated by sensory input.

Robert Worden [3] attributes primate social skills to the development of human language by proposing that "language is an outgrowth of primate social intelligence". One of his key hypotheses is that: "The internal representation of language meaning in the brain derives from the primate representation of social situations While some use of language is internal, for thought processes, this suggests strongly that it is an outgrowth of social intelligence ([3], p. 153)". Computers, on the other hand, have no social skills as social skills are based on emotions. The emotions of love, caring friendship and altruism are adaptive and increase the survival rate of organisms that possess them. Computers are not organisms, they have no will to live, they have no reason to communicate. They have no need to be adaptive.

The desire to communicate verbally has been attributed to three closely related attributes of human cognition, namely, a theory of mind, the sharing of joint attention, and the advent of altruistic behavior. In order to want to engage in the joint attention that Tomasello ([4], pp. 208–209) suggests was essential for the emergence of language it is necessary to have a theory of mind ([5], p. 102), namely the realization that other humans have a mind, desires and needs similar to one's own mind, desires and needs. At the same time, there must have developed a spirit of altruism ([6], p. 41) once a theory of mind emerged so that human conspecifics would want to enter into the cooperative behavior that is entailed in the sharing of information. Theory of mind and joint attention catalyzes the social function of communication and cooperative behavior and vice-versa. As computers could not have a theory of mind, have no reason to be altruistic and joint attention cannot take place in real time they have no desire to initiate communication and do not communicate unless the communication is initiated by their users.

Emotions, communications, and language are all interlinked as Darwin [7] pointed out long ago in his book, *The Expression of the Emotions in Man and Animal*, as noted by Hess and Thibault ([8], p. 120):

Darwin's basic message was that emotion expressions are evolved and (at least at some point in the past) adaptive. For Darwin, emotion expressions not only originated as part of an emotion process that protected the organism or prepared it for action but also had an important communicative function. Darwin ([7], p. 368) saw in this communicative function a further adaptive value when he wrote: "We have also seen that expression in itself, or the language of the emotions, as it has sometimes been called, is certainly of importance for the welfare of mankind".

If language emerged from the social skills of primates, which are emotion based, then it is hard to conceive how computers could evolve language as they have no emotions. I would add that since having social skills and the desire to communicate requires having emotions that in turn requires being alive. I cannot imagine how a computer could develop language. And if computers could not develop language how would they be able to have concepts and hence concept based consciousness. I therefore conclude that those that want to create the Singularity will have to figure out how to create a living creature from scratch with the complexity and emotions of a human, something that biologists cannot even imagine.

The AGI computer, that believers in the Singularity think will be created some day, will have to be capable of saying spontaneously without being programmed something along the lines of “I think; therefore, I am,” just as Descartes did when he said in Latin, “cogito ergo sum” and in colloquial French “je pense, donc je suis”.

Language not only allows humans to communicate abstract concepts to each other but it is also put to use for the internal dialogue of conceptual thinking. In my book *The Extended Mind: The Emergence of Language, the Human Mind and Culture* [1] I proposed that the mind is more than just the brain and that with language the mind was able to conceptualize in addition to processing percepts. As a consequence the human mind emerged with verbal language so that the mind = the brain plus language.

This idea parallels Darwin’s [7] expression of the co-evolution of language and the intellectual power of humans. It can be found in Chapter 21, p. 92 of *The Descent of Man: “A complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra”.*

A computer through AGI can become a brain of sorts but not a mind because it does not possess language and therefore cannot listen to its internal speech and therefore cannot become conscious. A form of intelligence that is not conscious of its mental processes is severely limited and therefore could never compete with the human mind.

4. AI Does Not Take into Account Work or Biology: An Acknowledgement

One of the core ideas in the argument I have presented in this essay is that the Singularity is not possible because computers are not and cannot be living organisms. While working on this project and searching my computer I encountered some notes I took of a conversation I had with Stuart Kauffman in 2006 while we were working on a paper entitled *Propagating Organization: An Inquiry* [9] (Kauffman et al. 2007). I share these notes because they reinforce my position that silicon based AI can never duplicate human intelligence giving credit to Stuart for what is of value and accept responsibility for whatever this argument lacks:

It takes work to make information. Information is embodied in some specific pattern of matter and energy. It takes work to pattern or shape that matter and energy. Life is a shaper of matter and energy that is capable of doing a work cycle if free energy is available.

AI does not take into account work or biology (I bolded the relevant part of these notes for this essay).

5. Robots and the Singularity

We have used the term computer to represent either a computer or a computerized robot. Murray Shanahan ([10], p. 5) has argued that “the only way to achieve human-level AI ... is through robotics” and a robot “with a biomimetic set of sensors ([10], p. 37)”. Shanahan suggests that through “whole brain emulation ... produced by scanning a brain and thereby producing a high-fidelity, neuron-for-neuron and synapse-for-synapse simulation ([10], p. 119)” consciousness could be achieved. As intriguing as Shanahan’s ideas are they fall short, in the opinion of this author, for the reason they do not into account two things: (1) the Kauffman criteria that a living organism must be capable of doing a work cycle and (2) Intelligence has an emotional component as described in the conclusion section below.

6. Conclusion: Emotions and Reasoning

The lack of emotions severely limits the scope of AI and makes AGI an impossible dream. Damasio [11] study of emotions revealed that:

Emotion is always in the loop of reason. Emotion is an adaptive response, part of the vital process of normal reasoning and decision-making. It is one of the highest levels of bioregulation for the human organism and has an enormous influence on the maintenance of our homeostatic balance and thus of our well-being. Last but not least, emotion is critical to learning and memory.

Since computers are non-biological they have no emotion and since according to Damasio emotions play an important role in reasoning, decision-making and learning, I believe, that the idea of the Singularity is an impossible dream. I am well aware that it was once proven that heavier than air flight was impossible which is why I have softened my conclusion as a belief. The obstacles to make a computer or a robot conscious are formidable as I have outlined in my article. AI and robotics as tools, however, in partnership with its human creators will advance human knowledge and productivity. Perhaps in an attempt to make computers/robots conscious other useful technology will be discovered so if the reader does not agree with my conclusions they at least have an idea of the scope of the challenge they face.

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