In an influential paper from 1993, Vernor Vinge argued, drawing from I.J. Good’s (1965) notion of the intelligence explosion, that we are quickly approaching a pivotal moment in history, where the advance of technology will become so rapid that we will not be able to predict future events at all. This paper was called "The Coming Technological Singularity."

In his paper, Vinge presented two scenarios for the singularity. First is the artificial intelligence (AI) hypothesis – the rise of machines that science fiction has played heavily on for the last three decades or so. The second is the intelligence amplification (IA) hypothesis that the singularity will also involve a biological component: us.

In this paper, I will argue first that the latter scenario is far more likely to happen than the previous one. Secondly, I will argue that the pivotal moment may be considerably closer than we have so far predicted. This argument will draw not only from Vinge’s hypotheses, but also from the extended mind hypothesis crafted by Andy Clark and David Chalmers.

The Technological Singularity

In "The Coming Technological Singularity," Vinge presents us with two scenarios. The first one is that with the exponential development of processing power, computers will eventually catch up with humans in terms of intelligence. Once human beings can build machines that are of equal intelligence, we will face an intelligence explosion: naturally the machines will then be able to repeat the feat, and so on ad infinitum. Regardless of whether there is an actual limit to processing power set by natural laws, it is a credible hypothesis to assume that with the possible advent of intelligent machines, we would see a steep exponential advent in the evolution of technology. There are at least two obvious problems with this singularity scenario. The first and the simple one is that it is based on a very naïve understanding of the human mind. Effectively the scenario is based on an analogy of the human mind and the computer – an analogy that has been amply called to doubt. Furthermore, even if the brain was in fact simply a very complex computer, there are still considerations that complicate the scenario greatly.

It has been tentatively shown recently that the complexity of the brain is of an order nobody had previously even imagined. In a study at the University of Stanford, it was discovered that each synapse in the brain resembles more a processor core than a transistor, as was previously thought. (Goldman 2010; see also Micheva & Smith 2007.) This sends the complexity of the brain to a level where a single primate brain will beat in complexity all the computers active in the world at the moment.
Of course, the argument from complexity is not a conclusive argument against the technological singularity. In the best case scenario – for the AI camp – it will simply set back the singularity some decades. Technology will still advance, and eventually, it will catch up.

The second argument, however, carries with it some considerably greater gravity. Namely, the argument equating intelligence with processing power is far from solid. First of all, there are several influential studies that have shown that intelligence is a far more diverse characteristic than just the capacity to carry out complex processing. Howard Gardner (1993), for example, has argued that there are several kinds of intelligences, out of which computers have been able to mimic only a very narrow choice – namely, some areas of analytic inference.

Second, one may also draw from the famous Chinese Room argument of John Searle (1980). In the thought experiment, Searle presents us with a scenario, where a person is put into a room, where he processes simple input of Chinese symbols, manipulating these according to a program. The person himself understands not a word of Chinese, but simply processes the input into the output based on the program. The question is: is this a cognitive process?

In fact, such processing – any processing done by a computer – is no different from the functioning of a steam engine. It is simply more complex. A transistor is like a valve, accepting two values. No matter how many transistors we build on top of one another, it is unlikely that at some point the contraption would magically come to possess cognitive capacity.

Therefore, explosion in processing power may not, in fact, create an explosion in intelligence, no matter how steep the evolutionary curve becomes. And even if AI were philosophically feasible – which is, of course, far from being conclusively disputed – the advent of an AI based singularity has been, even before the Stanford findings cited above, projected decades from now. Kurzweil (2005), for example, has predicted the AI singularity will take place in 2045. As I will argue below, it is, however, quite likely that the IA scenario will produce a singularity far sooner than that. This brings us to the extended mind.

The Extended Mind

In their highly debated paper “The Extended Mind” from 1998, Andy Clark and David Chalmers argued that there are situations where cognitive function can, in fact, include elements from the environment. In other words, the mind is not confined within the cranium, but may involve elements such as notebooks.

In the paper, Clark and Chalmers argue that if Otto keeps his knowledge of addresses in a notebook, that notebook is in fact a part of his cognition. He maintains beliefs concerning the addresses, because he may produce those addresses when needed, just like had he memorized them.
In other words, by being able to produce the proposition \( p \), such as "the museum is on the 53rd street," at will, we may argue that Otto believes that \( p \), regardless of whether the address is memorized, or in a notebook. Therefore, his cognition is extended into his notebook.

In a nutshell, the argument from the extended mind may be construed thus: if an element external to the body may be incorporated in a cognitive process so as to produce equal results in equal time, that external element is a part of cognition.

While the original Clark & Chalmers paper used the notebook as an example, during the last few years, there has been an explosion in the advent of potential extended mind technologies. With a touch screen phone, a person may access the internet wherever she goes. One can store notes in such web services as Evernote and access them instantaneously wherever she goes. The phone works, for all practical considerations, as an extended knowledge-base, an extended memory – and even as a kind of an extended sub-conscious, providing new ideas and inspirations in the form of social media feeds from such services as Twitter and Facebook.

Presently, it is possible to access information similar to what is normally committed to the declarative memory of a person in equal times as it takes to recall that information natively. Looking up the birth-year of Mozart on an iPhone takes a few seconds – not much longer than a music amateur needs to recall the information in a game of Trivial Pursuit.

On the grounds of the argument of Clark and Chalmers, when we have ubiquitous access to the internet, the information in the internet is a part of our belief system. We in fact know the information, just as if we had memorized it, because we can produce it just as if we had memorized it. The internet, insofar as it is accessible in real time, has become a part of our minds. This is the present situation. This situation is, however, very likely to evolve very quickly.

*The Social Singularity*

Wikipedia was founded ten years ago. Facebook went mainstream five years ago. Question-and-answer services such as Aardvark and Quora are only starting to build critical mass. The very moment that happens, we are looking at an intelligence explosion.

When I can ask a question on the internet, and an actual live person will answer that question immediately, not only will I be able to access the information on the internet like it was memorized. The same will then apply also to the information possessed by all the users participating in the real time question and answer service.

Consider that at the moment, by using a touch screen phone, a person may access a piece of information stored in the internet or in a personal database in
a matter of seconds wherever she is. What happens, when that information is not provided by a search engine, or being dug up from a database, but is provided by another human being, in real time? Right now, it is possible to access high-quality expert knowledge in times spanning from minutes to weeks by using such web services as Aardvark, Quora, or Elance. What happens, when this information is available real time?

When Wikipedia was founded, it was scorned upon: people assumed that the service cannot become reliable enough to be useful. However, in a study performed a few years ago, it was found out that Wikipedia is no less reliable as a source of information than the Encyclopedia Britannica. (Giles 2005.) This is due to the fact that once a critical mass of people start to use the service, the service will become socially self-correcting. While there may be trolls and hackers who provide misinformation, there are millions of active users, who will soon reset the information. The social congruence of the user-base keeps the service reliable.

Once a real-time question-and-answer service such as Aarvark or Quora gains comparable critical mass of millions of users, information possessed by every user of such a service will be potential information possessed by any other user, in terms of the extended mind hypothesis. In other words, while one can now know what one can Google up quickly, in a couple of years one can know what one can ask an information pool consisting of millions of human users. If this is not an intelligence explosion, then I do not know what is. And the advent of this development will be a question of years – not of decades.

The future is now – it's just not widely distributed yet, as William Gibson once quipped. The social singularity means that any human being will have real-time access to the knowledge and understanding of any other human being on the network. The singularity is near, and the singularity is us.

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