Symbolic Intelligence

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Imagine a computer, a massively multithreaded, parallel processing system that operates under layers of unique data filters. These filters, depending on their implementations, alter input and output data in meaningful ways. This system should be capable of analyzing data from any given situation autonomously and of developing multiple calculated results, or returns, at once. These multiple results, based on this complex system of processes and filters, would be regarded as “choices” that the operating system has at its disposal. Some of its functions would be handled by its subroutine managers; others would be held in its current main memory, and all functions would be influenced either directly or indirectly by its filtering systems. Ideally, this system would not be hindered noticeably by the bottlenecking issues that plague modern parallel processing systems.

Let us propose that this system may be capable of emulating the human process of learning, whereby at least one primary system, in conjunction with various subsystems, works to alter memory in a separate system of the unit. This process could be enhanced by data filters that represent conditions and elements that would impact the learning process in a person, such as various emotional states or personal experiences.

This computer at hand is meant to represent an analogue for the human brain. The closest analogue for the brain currently known to man actually is the modern computer, which is clearly deficient in comparison, but it is not hard to make the imaginative leap to acknowledge the validity of this comparison. The brain after all is a kind of processor, massively interconnected, or multithreaded by an intricate network of synapses, simultaneously processing information from multiple systems. Our emotions and biological rhythms are directed by the endocrine system, which acts as a kind of filter through which our perceptions, thoughts, and behaviors are altered. Our ability to reason and capacity for emotion are arguably the traits that most significantly define us as human and separate us from other animals and, in this case, from other things.

Simply put, people possess true intelligence and consciousness. Computers can only emulate intelligence through predetermined mechanical processes. Douglas Hofstadter, the famed mathematician, illustrates this difference with his "MU" puzzle. Hofstadter presents a word-manipulation system, originally presented by Emil Post, which applies a set of rules to a given set of letters—a string of letters— to develop a formal language (33-41). The puzzle starts by giving the player one such string, "MI." It charges the would-be solver with the task of using the puzzle's rules to develop the string "MU," except that the rules given are non-conducive to achieving such a result. The puzzle is not solvable because the rules inevitably goad the player into building strings that never render the desired result, but the rules are complicated enough that this fact is not obviously seen. Hofstadter's purpose in presenting the "MU" puzzle is to illustrate different approaches to handling such a formal system or any real world problems for that matter. The mechanical approach to solving a problem is, in many ways, different from an intellectual one.

Hofstadter illustrates how differently a machine and a human would approach the unsolvable puzzle. Essentially, the machine would simply run forever, combining the rules of the puzzle to create more and more theorems (new strings based from "MI"); meanwhile, the strings get longer and longer, never collapsing down to "MU." A human, on the other hand, will soon become frustrated and give up. Unlike machines, people can operate on various levels of consciousness at a time, and they can alter their perceptions at will, popping from one sphere of thought to another to analyze a given problem from various points of view. People can "pop" in and out of systems, such as observation, thought, and behavior. People can work mechanically and logically on the puzzle for a while, and then they can examine the system itself to find its flaws. This flexible approach involves acts of perception, of consciousness. Hofstadter states, "Even if a person is not very bright, he still cannot help making some observations about what he is doing" (36). This act of self-observation is not just an attribute of the human mind—it is its imperative.

At this point, one can draw the metaphorical line in the sand. Computer scientists, mathematicians, and many others debate constantly about whether or not it is even possible for a computer to become the intellectual peer of, or even superior to, a human being. Furthermore, the debate becomes more intense over whether or not such fabricated intelligence could be self aware. Computers must be told what to do. If they are to be intelligent, they must be told to be, and shown how. Therefore, it can be said that they do not learn but that they are simply programmed.

Arthur C. Clarke famously coined these "Three Laws of Prediction":

> One: When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong.
>
> Two: The only way of discovering the limits of the possible is to venture a little way past them into the impossible.

Three: Any sufficiently advanced technology is indistinguishable from magic. (Parkinson)

However glib they may be, there is wisdom in these statements. For an argument, let us pay special attention to the third law. Certainly, some technological advancements have accomplished magical feats. An ancient person probably would not discern that a computer, or a television, or a microwave, was anything short of a magic box. The difference is comparable to the difference between monsters and animals; we know that monsters do not exist and animals do. Actually, if one were to discover a monster, something nasty with razor sharp fangs and glowing red eyes, the scientific community would undoubtedly classify it as an animal species and said monster would lose its mystery. Magic too would be less awe inspiring if its mechanisms were understood and dissectible, especially if those mechanisms were logical as they probably would have to be as a prerequisite to existing. Many elements in popular science fiction hold such magical appeal. From quantum teleporters and flying cars to genetically engineered humans and intelligent machines, there is an array of possibilities, most of which seem plausible, but many are so complex and far beyond our understanding and abilities that they fall under the category of the fantastical. It follows, however, that today's science fiction may some day become manifest.

Intelligence is a phenomenon that is traceable in the history of mankind. Archeological evidence points towards events such as the invention of the first tools or the evolution of early language, as being catalysts for the development of the human intellect. Consciousness and how it came to be are still enigmas to us today. Our personal perceptions thwart our abilities to analyze and define our intelligence objectively. In other words, one needs to be separate from a system in order to objectively describe that system. This reality, which we all perceive as individuals, is the one formal system that we cannot "pop" out of and observe. This observation suggests that what it is to be intelligent is not clearly defined because it is not clearly observable with true objectivity.

The argument that computers will never become intelligent is flawed. Some who support it believe that since computers must be told what to do, they can understand only Boolean logic, and since some things, such as moral values, personalities, and emotions, are not believed to be programmable, machine intelligence can never meet or surpass human intelligence, so a CPU can never be as complex as a single human brain. Nevertheless, to suggest that there is something special about people that cannot be replicated is to suggest that there is something magical—even spiritual--about people that cannot be made by human hands.

Perhaps this claim is true. Perhaps it is ridiculous to think that people are capable of creating artificial life. Furthermore, there is validity in the idea that, even if machines could surpass human intelligence, they may not be conscious of it. They may simply be elaborate imitations; facsimiles are ultimately constrained by rules. We are assuming that we are a special case, not to be repeated. It is possible that the act of "being intelligent" is already an act of emulation or simply a function of survival. For example, language, our ability to communicate and express ourselves, is a type of emulation, an act representing thought. The feelings we have are arguably facsimiles, symbolic representations of our bodies and our minds.

Maybe the real, irreconcilable difference is purely biological. Maybe the first intelligent computer will be based on a biological design. We are self-aware, but it is impossible to know whether that is not just the result of a complex, structural, system. The process by which our eyes take in light and our brains process an upside down image to be right side up is entirely structural. Vision is explainable by science and emulatable, yet when we use our eyes to look at something, we are hardly aware that anything complicated is ever happening. We cannot observe our awareness in this way, and we know far less about how our self-awareness works. This lack of understanding, if nothing else, should be the reason that we may never develop a self-aware machine because we do not understand how we developed our own.

There is no reason to think, other than out of enduring human sentiment, that those systems that compose us and ultimately constitute our thoughts and feelings cannot one day be reproduced. The questions should be about whether or not it matters if we can discern a machine's consciousness. We should be more concerned about what our responsibilities would be if we created something even remotely conscious and how such an event would change us. Would we cease to be special and perhaps lose a little of our own mystery?

Works Cited

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