# Will Biological Computers Enable Artificially Intelligent Machines to Become Persons?

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Have you ever participated in an intelligent conversation about "artificial intelligence"? Artificial intelligence (AI) is a phrase that is often heard, especially in the context of recent movies, but rarely understood. In general, AI refers to the automation of intelligent behavior via mechanisms such as computers. In this article, I will consider some advantages of biological computers, discuss current views of AI, and conclude with a discussion of personhood.

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### Biological Computers

Biological computers consist of both biological and mechanical material. Two main advantages of biological computing are small size and rapid speed. In 2001, a group of Israeli scientists created a prototype biological computer—with enzymes as the "hardware" and DNA as the "software"—that may someday patrol a human body for the detection and/or treatment of disease. This computer is able to run approximately one billion operations per second with 99.8% accuracy. Astonishingly, one billion of these biological computers could fit inside a drop of water!

In 1999, a group of scientists from Emory University and Georgia Tech made a calculator (called the "leech-ulator") with neurons taken from leeches. In normal silicon computers, connections are made between the computer's chips only when the programmer directs the connections to occur. However, in a biological computer the neurons are able to connect on their own and are often said to be "thinking" by making connections with their neighbors, possibly increasing computational power. Since the processing power of the silicon chip is close to being maximized, the next generation of computer technology may rely on the use of biological computing. A billion operations per second is impressive indeed, but when the prospect of massive neural connectivity is considered, the speed is almost unfathomable.

The "leech-ulator" demonstrates that the ability of neurons to make local connections might be an advantage on which artificial intelligence could capitalize. Suppose scientists are able to map the neural and chemical processes in the brain completely; could a biological computer be made based on this map? The answer is a resounding yes, because the technology to produce a computer duplicating a map (once it is provided) is already available. Such capabilities raise ethical questions. Is an artificially "intelligent" computer a person? How do we define a person? Are human beings more than the neural signals and chemical reactions in their brains?

## Artificial Intelligence

Proponents of AI may support one of two views: strong AI and weak AI. Proponents of strong AI believe that machines can duplicate human intelligence in its entirety, including a sense of consciousness. Proponents of weak AI, by contrast, believe that machines can merely simulate intelligence or act as if they possess intelligence. The prevalent attitude among most AI researchers is to accept the weak AI hypothesis and simply to ignore the strong AI hypothesis. As long as the computer program works, whether it is called a simulation of intelligence or real intelligence is regarded as unimportant.

Many people participate daily in activities involving weak AI, with the most popular enterprise being "gaming." Since the computer "Deep Blue" successfully defeated chess great Garry Kasparov in 1997, we are no longer able to say that a human being is the world chess champion. However, it is important to note that Deep Blue does not mimic the way a human being would play chess, but instead calculates outcomes based on all possible moves and then selects the move with the highest probability of winning. Weak AI also contributes significantly to applications such as speech recognition, machine translation, and search engines.

Traditionally, strong AI has been connected to determinism. Determinism claims that all behavior is the result of preceding events. The idea that machines can duplicate humans implies that humans are deterministic creatures who make decisions based on some predetermined brain "program." One of the challenges of strict determinism to the Christian worldview may be framed as follows: If a person is just following his or her "program," then do notions of responsibility, sin, and redemption even make sense? For instance, if a computer is programmed to run the Windows operating system (OS), the computer is doing what it was created to do—even though some people might consider running Windows a sin. In a strict deterministic worldview, the concept of right and wrong quickly becomes very hazy.

Proponents of strong AI are not necessarily strictly deterministic, however. In fact, biological computers may make the most dramatic impact on AI in connection with silicon computer chips. If a neural network can be trained to imitate thought, then scientists could connect this "think-ing" neural net to a computer chip, resulting in a non-deterministic component of a machine.

## Personhood

With the development of strong AI, personhood has increasingly come under attack. Definitions of personhood are loaded with terms that are unique to the human race, but advances in strong AI are challenging these definitions.

The secular definition of personhood has an assumption of naturalism embedded within. A logical implication of naturalism is that every aspect of a human may be reduced to a material basis. While this view of personhood may not seem to be challenged by AI, "intelligence" is an assumption of strong AI that has major ramifications for the naturalistic concept of personhood. Defining intelligence by some barometer of the average mind risks the implication that many in our culture are not intelligent or are without minds. Even without presuming the existence of God, such an assumption about intelligence demeans an entire segment of humanity.

Central to a Christian concept of personhood is the image of God. A strong AI perspective poses challenges to three common views of how human beings bear the image of God—the functional, the relational, and the substantive. The functional perspective concentrates on what we as human beings do. This view comes under attack as we consider our response to whether or not we are deterministic creatures. Did God create us in such a way that we follow a brain "program," or is there an aspect of free will in our function?

The relational view of the image of God focuses more on our ability to have relationships with others and with God. In his book *The Frontiers of Science and Faith,* John Jefferson Davis chooses to focus on the security of the relational view in the face of strong AI. Davis's point is that instead of seeing strong AI as an attack on the unique creation that we are in Christ, we should regard our ability to have a relationship with God as the element that will ultimately set humans apart from "intelligent" machines.

The substantive view focuses on the image of God as manifested by certain qualities or characteristics within the make-up of the human being—i.e., on what a person is. The most common aspect referred to in this view is reason. The substantive view of the image of God is the view that comes under the greatest attack when confronted by the assumptions of strong AI. However, through studying our uniqueness as creations of God, the substantive view is also the one that is most strengthened. Millard Erickson says that this view should prompt us to focus on the duplication of the attributes of God in our own lives. It is enlightening to study, one by one, all of the attributes of God and to reflect on two things: 1) how amazing it is that God

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chose both to reveal those attributes to us and to allow us to possess portions of them, and 2) how difficult it would be for us to create a computer that duplicates these attributes.

At the same time, AI may prove in the end to be more versatile than we anticipate. Accordingly, we might be wise to give more careful consideration to what some already maintain is a more accurate biblical understanding of the image of God— i.e., one that sees the image as attaching uniquely to human beings regardless of their capacities.[1]

## Conclusion

To answer the question that was posed in the title of this article, I do not believe that biological computers will enable artificially intelligent machines to become persons. While AI may have both positive and negative consequences, it is limited in its capacity to duplicate human beings because there is far more to reproducing a person than simulating his or her neurological processes. I would invite Christians to keep abreast of developments in AI, but also to be encouraged by their uniqueness as creations in the image of God! ■

[1] For example, see John F. Kilner, "Biotech and Human Dignity," CD available from CBHD, 2003 (part of a forthcoming book from CBHD).

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