TOK A

External Assessment

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Can a Machine Know?

Machines. The creation of man to carry out processes for his own comfort. Many kinds of machines exist and are used today by mankind, such as computers, televisions, locomotives, and dishwashers. Humans, who 'know', created machines, but can this ability to 'know' be passed onto a nonhuman creation? Can a machine 'know?' This is a contemporary issue portrayed in books and movies, such as in the film the Matrix, where machines 'know' --being aware of their existence-- and take over the world. Today, the dynamic changes in science and technology further integrate the use of machines in our world, thus increasing man's dependency on his creation. Since computerized machines perform processes most similar to human thinking, computerized machines will be focused on for this question of the ability of a machine to 'know.'

First, to clearly answer the question "can a machine know," the meaning of the word 'know' must be clearly defined. This is a problem of language for the meaning of the word 'know' is ambiguous and can have multiple interpretations. For example, in the sentence "I *know* you've got a high score on the SAT," the word 'know' could mean many things such as 'truly believe,' 'understand,' 'guess,' 'feel,' 'think,' and 'learned.' In the case of the question

"can a machine know?" the meaning of 'know' apparently seems to be referring to the meaning of the word when used of humans, who like machines are also a form of a system which performs certain functions. Usually, when someone says that "humans know," the word 'know' refers to man's ability to understand. Thus, for the question "can a machine know?" the appropriate definition of 'know' is 'understand.' However, it is important to note the ambiguity of the meaning of the word 'understand.'

The view that 'machines can *not* know', states that machines are just objects humans create and can not be cognitive, or 'knowing.' This view's definition of the word 'understand,' linked closely to the word 'know,' is the ability to be aware of semantics –the meaning, or the connotation of facts. The idea that machines only store data as symbols, or

intelligence- are only following a set of instructions in the form of syntax and are not cognitive of their actions. A computer is only a contraption made by man to perform certain functions. It is no different than the mechanism of a switch, which can be switched either on or off, as all computers function on the basic 1-0 "on-off" switch. Their "cognitive state" is like that of a clock –a simple contraption that works using gears, screws, and a battery to electrically power it. They neither think nor 'know.'

Thus, emotionally, computers are generally considered to be inept. Computers can only imitate the expressions of emotion. However, in humans ourselves there is no tangible way of proving the existence of emotion in a human. Perhaps expression defines emotion.

Thus, a well-programmed robot that exhibits characteristics of a being in an emotional state can be argued to be emotional.

Another argument that supports that machines can not 'know' is that they do not have any concept of choice, or free will. Humans make cognitive choices based on physical drives and mental processes, which are intricately intertwined together. Machines lack emotions, and thus, theoretically, do not have physical drives. They have a primitive and mechanical cognitive state. Can they use their data and programs to make decisions? Well, it can be argued "no" for machines do not make decisions, or choices, but only follow programs, which determine for them the "best" action to take. They have no free will, but are captive to a set of rules which govern their functions. Thus, because machines do not have free will, it can be argued that they can not 'know'.

Additionally, since machines are not 'self-aware' it can be argued that machines can not 'know.' In the area of scientific technology, the "Turing Test" also supports this argument. Sites, such as "Yahoo!" use the test –done by distinguishing humans from computers- to prevent computer programmers from competing sites to use programs to generate numerous accounts on "Yahoo!" and clog up their sites. It performs this by asking the human or computer to identify the syntax in a picture of words and/or numbers to create an account. Computers can not determine the words and/or letters in these types of pictures, and thus, they must not be 'knowing' beings or at least must be less 'knowing' than humans.

Next, the approach that 'machines *can* know' will be taken. To further understand the question "can a machine know?" a parallel situation can be observed in religion. It is widely accepted by the major religions of the world that a God created humans. Looking at this

relationship between God and humans, the character of the effects of the creator on the creation can be observed. This can be compared to the relationship between man and machine. Thus in this analogy, man is the creation –like the machine from our view. Tying to the corresponding beginning lines of this essay, which define the purpose and nature of the creation, it can be said: "Man. The creation of God to carry out processes for his own comfort/glory." As human beings our perspective on the question of knowledge in ourselves and in machines is biased. We automatically acclaim ourselves with the characteristic of being "knowing." However, in the eyes of *our* Creator humans could seem like "unknowing," in our perspective, machine-like beings. As humans we claim we can think, but are not *we* like machines? The 'knowing' in humans can be defined as just the electrical signals running through the neuron cells of the brain. How different is that from the 'knowing' in machines, which is the electrical signals running through the wires and chips? In this sense, humans are merely biological constructions, while machines, too, are metallic, plastic, and wired constructions. Humans like machines are limited too in their cognitive abilities. Thus, because humans are only biological constructions limited by the physical world and classified as being 'knowing,' machines --which are only a kind of creation too--, can be classified as 'knowing.'

There is some evidence that suggests that machines can 'know'. *Racter*, an artificially intelligent computer program, allegedly wrote the book **The Policeman's Beard is Half Constructed**. The following excerpt seems to indicate "knowingness" in the computer program:

"More than iron, more than lead, more than gold I need electricity.:I need it more than I

need lamb or pork or lettuce or cucumber.:I need it for my dreams..." ("Racter"). However, the fact that the writing is based on a program which provided the layout for the piece goes against the idea that machines can 'know.'

In the area of language computers can 'know' to some extent. They are programmed to communicate to humans using the syntax of language. But because modern computers can fairly accurately communicate to humans using words, computers can be said to have some semantics of language syntax. An example of machines 'knowing' in language is computers being able to spell-check and grammar-check. To do this, computers must have some understanding of the rules of language.

It can be perhaps most easily argued that machines 'know' in terms of reason. This is because programs in machines use logic, basing conclusions from stored data in a structured way. For example, through mathematical reasoning, a computer will conclude that A equals C by the transitive property, if A equals B and B equals C. In terms of perception, however, computers can be said to be limited. This is because a computer's perception is not innate, but is built-in by the programmer, thus being human dependent. Still, computers can be said to have some perception for cameras, smoke sensors, and microphones all give computers data about its surrounding environment. Recently, at Cornell University researchers developed a special robot (Schmid). When its 'legs' are damaged, this 'walking' robot can observe and gather data from sensors of its new situation (Schmid). Using this information, it can create a computer model of its new structure and movement and use it to 'walk' again (Schmid). Therefore, because this robot can observe its surrounding to adapt, machines can be argued to have a degree of perception.

Many ethical questions arise concerning this topic. Questions about their rights as cognitive beings arise. "If machines can 'know,' do humans have the right to 'enslave' them?" Also, like it is suggested in science fiction films and books, if machines 'know' could not they obtain a mind of their own and attempt to take over the world?" If this danger is real, the question of whether industries have the right to endanger society by making machines comes up. Additionally, "If machines can 'know' —which makes them beings- do humans have the right to create life?" Many other similar controversial issues arise concerning the idea that machines can 'know.'

In conclusion, taking all the facts into consideration, the argument that machines can not 'know' seems to be stronger. However, by breaking down the ability to 'know' into its components, machines can be said to 'know' to some extent in terms of perception, logic, and language. Over time as technology further develops, machines may eventually become 'self-aware' and 'knowing.' But for now, it can be safely concluded that to a great extent machines can *not* truly 'know.'

Word Count: 1600