Advanced Artificial Intelligence Essay, Research Paper

Artificial Intelligence: Cognitive Ability or Information Processing Computers have become an integral part of our everyday lives. We rely upon these machines to perform innumerable tasks that we often take for granted. Most people realize that computers are able to perform the multitude of functions as a consequence of the programming they receive. These programs give computers a set of instructions that governs their transition from one information processing state to another. Thus, computational machines are able to respond to a certain set of inputs with a certain range of outputs. In order to comprehend programs one needs only to describe these instructions in functional terms. In this regard, computer programs are extremely similar to functional accounts of the human mind, which contend that in order to understand the mind, one must simply examine the relationship between stimulus and behavior. Consequently, the question has naturally arisen as to whether a computer which consisted of a sufficiently sophisticated program would be capable of thought. This question has resulted in lively debate, with one camp of people including John R. Searle emphatically denying the plausibility of Artificial Intelligence. On the other side of the debate, individuals such as Paul and Patricia Churchland have declared that although a serial machine with a program might not be able to think, Artificial Intelligence might be feasible in parallel processing computers. In ? Is the Brain?s Mind a Computer Program, ? John R. Searle presents an interesting argument against strong artificial intelligence proponents. Believers of strong artificial intelligence contend that a computer that can pass the Turing test is displaying cognitive ability. The Turing test basically states that if a computer can function in such a way that an expert can not distinguish its performance from that of a human who has a certain cognitive ability, such as the ability to understand a language, then the computer also has that ability. Proponents of weak artificial intelligence have a much less forceful view which states that if a computer can pass the Turing test it is merely a successful model of the mind. In his essay, it is the strong AI proponents whom Searle is critiquing. Searle?s argument against artificial intelligence can essentially be summed up in three simple statements: (1) Computer programs are formal/syntactic (2) Human minds have mental contents or semantics (3) Syntax by itself is neither constitutive of nor sufficient for semantics. From these three statements Searle concludes that, ? Programs are neither constitutive of nor sufficient for minds.? In order to illustrate his argument, Searle then utilizes the so called ?Chinese room? argument. The Chinese room simulation commences with a person who has no knowledge of the Chinese language. This person is then placed into a room containing baskets full of Chinese symbols. In addition, this individual is provided with a rule book (in a language which he or she presumably understands) for matching Chinese symbols with other Chinese symbols. The rules identify these characters solely in terms of their shapes and do not require any comprehension of them. The argument then asks that you imagine that there are people outside the room who understand Chinese and who hand this person symbols which pose certain questions. In response, this person manipulates these symbols according to the provided rule book, and hands back certain symbols. The symbols that this individual returns, unknown to the person inside the room, are answers to the questions which these native Chinese speakers are posing. Furthermore, this rule book makes this person?s answers indistinguishable from a native Chinese speaker?s. Hence, this individual would be able to satisfy the Turing test for comprehension of the Chinese language, although he does not actually have any understanding of the language. Searle then makes the analogy between the rule book and a computer program, the person and the computer, and the symbols and a computer?s data base to ?decisively? demonstrate that symbol manipulating devices are not enough for cognition. In Searle?s opinion, computers can never be minds because they are inherently different from brains. He argues that brains do not merely instantiate a program but also cause mental events by virtue of specific neuro – biological processes. Searle is essentially making the contention that brains, by virtue of their specific biochemical properties, cause minds. Consequently, according to Searle, any artifact that produced mental phenomena would have to be able to duplicate the specific causal powers of brains and it could not do that just by running a formal computer program. Although it is interesting to contemplate, Searle?s argument definitely has its share of flaws. The Churchlands, as proponents in the possibility of artificial intelligence to duplicate the mind, (yet not believers of strong AI as it was previously defined ) do their best to illustrate these weaknesses in his theory. The primary objection which they have with Searle?s argument against the plausibility of artificial intelligence lies with the third premise in his original proof. The Churchlands argue that this premise, which states, ?Syntax by itself is neither constitutive of nor sufficient for semantics,? is an assumption rather than a fact. Additionally, they contend that to assume its truth is tantamount to ?begging the question? against classical AI. Classical AI rests on the premise that if one can set in motion an appropriately structured interaction of syntactic elements, correctly connected to a system of inputs and outputs, it can produce the same cognitive states found in human beings. In essence, Searle is simply assuming that this theory is not accurate. In order to demonstrate this, the Churchlands compare the Chinese room argument with the luminous room argument. The luminous room argument seemingly decisively rebukes James Maxwell?s 1864 posit that light and electromagnetic waves are identical (A fact which is now known to be true). This proof is structured to be similar to the Chinese room argument, and thus also has three basic premises: (1) Electricity and magnetism are forces (2) The essential property of light is luminance (3) Forces by themselves are neither constitutive of, nor sufficient for luminance. The conclusion that can be reached following this set of premises is that electricity and magnetism are neither constitutive of nor sufficient for light. To demonstrate this, believers in this false conclusion could place an individual in a darkened room, and have him move a magnet up and down. When the magnet, which releases electromagnetic waves, fails to produce light opponents of Maxwell?s theory could then use this as evidence to assert the validity of their erroneous conclusion and claim victory. Nonetheless, absurd as this conclusion may appear now, the Churchlands point out that during the 19th century, when the scientific community did not appreciate the systematic parallels between the properties of light and of electromagnetic waves, this argument could have served as a compelling rebuttal to Maxwell?s hypothesis. Furthermore, Maxwell himself would have had difficulty trying to refute this conclusion. He could have argued that the magnet was moving at an extremely low rate of oscillation, yet critics could counter that the rate of oscillation was irrelevant, and that all that was need to create light according to his theory was present in the darkened room. Maxwell might then make the seemingly ridiculous assertion that the room in fact is bathed with light, yet this tacit would probably have elicited the response that it is obvious to any person that the room is pitch black. This would leave Maxwell with only three methods by which to refute the argument. He could insist that premise three of his detractors argument was false, that the luminous room argument demonstrated nothing about the nature of light, and that an ongoing research program which investigated the relationship between of both these phenomena was required in order to settle the dispute. In the same manner, a proponent of artificial intelligence would then have only three similar arguments to respond to Searle?s theory. He could argue that Searle is not in a position to insist that rule governed symbol manipulation can never constitute semantic phenomena and that the Chinese room experiment demonstrated nothing about the nature of mind. Additionally, he could contend that semantic and cognitive phenomena have yet to be explained and that Searle exploits our ignorance of these phenomena to prove his argument. The Churchlands then attempt to justify their own theory regarding how artificial intelligence might be possible. They assert that presently existing computers are not capable of cognitive ability as a result of the serial manner in which they process information. Instead, they contend that parallel processing computers, which process data in a similar manner as the human mind, might one day be able to exhibit cognition. They arrive at this conclusion for a number of reasons. First, the Chuchlands feel that a parallel processing system would offer a dramatic speed advantage over conventional computers. Second, they believe the parallel nature of the system makes it more fault tolerant and functionally persistent. Finally, the Chuchlands contend that a parallel system would be able to store large amounts of information in a distributed fashion, which could be accessed quickly. They argue that these three characteristics might one day make it possible to create a machine sophisticated enough to exhibit cognition. Furthermore, this parallel machine would not be manipulating symbols according to structure sensitive rules. Rather, the Churchlands argue, symbol manipulation would be just one of the many cognitive skills that this system might learn to display. Accordingly, rule?governed symbol manipulation would not be this system?s basic mode of operation and it would consequently be free of the Chinese room argument2. Both of these hypotheses regarding artificial intelligence are extremely interesting. Each of them forces us to evaluate exactly what our conceptions are regarding the human mind and our ability to comprehend it. Perhaps a time will come when mankind will unlock the door to the mystery of human cognition. Yet, even if we do not, coming to a complete understanding of the mind is not what is relevant, rather learning more about ourselves is what is truly important. 1. By making this assertion, Searle is basically arguing against the plausibility of an artificial intelligence system since it would have to have the causal powers of a brain. In order to have these causal powers, Searle maintains that this system would require biochemical elements. Therefore, according to this definition Searle is allowing for the possibility of artificial intelligence. Recognizing this, the Churchlands attack the second portion of his assertion concerning biochemical properties, arguing that this statement is much too strong since not enough is known about cognition to contend that a biochemical structure is required. The Churchlands feel that a machine might be able to use something other than biochemical structures to achieve consciousness (parallel processing). 2. Searle does have a response to this parallel processing hypothesis. In essence he proposes the idea of the Chinese gymnasium, in which he organizes people into a parallel network. From there he returns to the same argument he made previously and states that these people still do not understand Chinese. Yet the Churchlands respond by saying that (a) the individual neurons of the brain do not understand English and (b) Searle neglects to mention that an enormous amount of people would be required for this simulation. Thus, they argue that a slow, oddly made, functional brain might exist if one could create a situation with enough people who were organized correctly. They recognize that there is no guarantee that its activity would constitute real thought, since the theory they are utilizing positing how the brain functions might not prove to be correct. However, they feel that if this theory is proven to be correct, it would be likely that this simulation would have cognitive ability.