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# Minds and Machines<sup>1</sup>

Gerard Casey

School of Philosophy

University College Dublin

[Gerard.casey@ucd.ie](mailto:Gerard.casey@ucd.ie)

[www.ucd.ie/philosophy/staff/casey\\_gerard.htm](http://www.ucd.ie/philosophy/staff/casey_gerard.htm)

The emergence of electronic computers in the last thirty years has given rise to many interesting questions. Many of these questions are technical, relating to a machine's ability to perform complex operations in a variety of circumstances. While some of these questions are not without philosophical interest, the one question which above all others has stimulated philosophical interest is explicitly non-technical and it can be expressed crudely as follows: Can a machine be said to think and, if so, in what sense? The issue has received much attention in the scholarly journals with articles and arguments appearing in great profusion, some resolutely answering this question in the affirmative, some, equally resolutely, answering this question in the negative, and others manifesting modified rapture. While the ramifications of the question are enormous I believe that the issue at the heart of the matter has gradually emerged from the forest of complications.

It is easy to answer the question "Can machines/computers think?" Easy, that is, once we know with some degree of precision what thinking is, what machine/computers are, and, last but not least, how to understand the word "can." The possibility of answering the question, "Can a computer think?" is rendered either question-beggingly trivial or mind-bogglingly impossible unless one is able to give some independent signification to its key terms. To define a computer as a sort of machine, and then to define machine in such a narrow way that it becomes meaningless to ask if it thinks viciously begs the question unless the definitions can be given independent justification. Of course, a similar consideration applies to arguments in favour of artificial intelligence. I assume that the majority of those who would put this question intend by "think" something like

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<sup>1</sup> This paper was originally presented at the Tenth Annual Conference in Philosophy of the Royal Irish Academy. I wish to thank the participants in the conference for their comments, and especially my colleague Brendan Purcell for his intellectual and moral support. I should also like to express my gratitude to this journal's anonymous referee for his helpful remarks. For more on this topic, see Gerard Casey, "Reply to Professor Anderson," *American Catholic Philosophical Quarterly*, Vol. 64, No. 4, pp. 621-22.

“think in the way that human beings do or least in a sufficiently similar way.”<sup>2</sup> The characterisation of the computer may also be problematic but for the purposes of this paper, I shall take it to be trouble-free.

In his book. *Minds, Brains and Machines*, Geoffrey Brown remarks that, “If what we are after is a theory about the relation between the physical and mental aspects of machines, then this cannot be independent of some broader account of the relation between the mental and physical in general.”<sup>3</sup> Having read much of the philosophical literature on artificial intelligence,<sup>4</sup> I believe this point to be absolutely crucial. If the ancient dispute on the mind/body problem can be resolved, then the question as to the possibility of artificial intelligence almost answers itself; the position one adopts in regard to the mind/body problem significantly affects one’s views on the possibility of artificial intelligence. To set up the discussion I shall employ a taxonomy of the four basic positions which can be adopted towards the mind/body problem, a taxonomy derived from the writings of Mortimer Adler.<sup>5</sup>

Mind/Body theories can be divided immediately into two basic kinds: immaterialistic or materialistic, each of which can be subdivided into an extreme and a moderate form. We then have four basic positions: extreme immaterialism [1], moderate immaterialism [2], moderate materialism [3], and extreme materialism [4]. Let us first of all contrast the extreme forms of both basic positions. The extreme immaterialist holds that the mind is an immaterial substance and that the body is neither a necessary nor a sufficient condition for its existence or operation. The extreme materialist, on the other hand, holds that the body and the mind are both existentially and analytically inseparable—the mind is ultimately an illusory entity and mental language is a convenient, although ontologically unreliable, mode of speech. The moderate forms of the two basic positions can be contrasted as follows. The moderate materialist holds that the body and the mind are existentially inseparable but analytically separable, that this separability is contingent, and that the body is both a necessary and a sufficient condition for the mind. The moderate immaterialist, while agreeing with the moderate materialist that the body is a

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<sup>2</sup> As we shall see below, one common approach is to take terms in common use that primarily signify specific human capacities and apply them to animals or machines in a highly restricted way. In time, the restrictions are forgotten about and then the terms are applied without any limitations in meaning.

<sup>3</sup> Geoffrey Brown, *Minds, Brains and Machines* (Bristol: Bristol Classical Press, 1989), 102.

<sup>4</sup> Most of it centered on the twin cautionary tales of Turing's “Imitation Game” and Searle's “Chinese Room.”

<sup>5</sup> Mortimer Adler, “Intentionality and Immateriality,” *The New Scholasticism* 41 (1967): 312-44. See also his article. “The Immateriality of Conceptual Thought,” *The New Scholasticism* 41 (1967): 489-97.

necessary condition for mind, simultaneously denies that it is a sufficient condition for mind. It is important to understand clearly that both moderate theories agree that human beings have the power of conceptual thought and that the body, that is, a suitably organised central nervous system, is a necessary condition for the mind. They disagree only on the question of whether the body is also a sufficient condition for the mind.

Because the extreme version of a theory is more easily criticised than its moderate version, the tendency of partisans on both sides of the materialist/immaterialist divide is to focus on the extreme version of the other theory and to ignore the moderate version. Although the extreme immaterialism [1] has its defenders—classically in Plato and Descartes and more recently in Popper and Eccles<sup>6</sup>—I shall not argue for or against it here; I simply assume its untenability. This leaves the positions of moderate immaterialism [2], moderate materialism [3], and extreme materialism [4]. Although there are those who believe extreme materialism to be philosophically untenable, a philosophical dead horse, as it were, there is no universal agreement on this point. If this horse has ever been dead then it must have miraculous powers of resurrection, for today it is alive and well and living under the name of Eliminative Materialism.

I shall begin by presenting an argument intended to show not that extreme materialism is false, but that if it is true we can never assert that it is true, still less justify its assertion by means of rational argumentation. Having thus (I hope) disposed of position [4], I shall then present what I take to be the strongest argument for position [2] and I shall go on to conclude that, of the two moderate theories, moderate immaterialism [2] and moderate materialism [3], moderate immaterialism gives the more satisfactory account of human conceptual thought. Finally, I shall draw the consequences of this conclusion for the question of artificial intelligence, which are first, that the possibility of realising anything significantly resembling human intelligence in a non-living, non-conscious machines is extremely improbable, and second, that one's position in regard to the possibility of artificial intelligence is determined largely by what one takes antecedently to be the most tenable theory in the philosophy of mind. I realise that my overall argument as is here presented is dialectically incomplete: to complete it I should be obliged not only to argue for moderate immaterialism, which I shall do, but I should also be obliged to refute both extreme immaterialism and moderate immaterialism explicitly, and this I have not attempted to do. The modest object of this paper is to re-present to a

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<sup>6</sup> Karl R. Popper and John C. Eccles, *The Self and Its Brain* (New York: Springer-Verlag, 1977).

contemporary audience what I take to be the strongest argument for moderate immaterialism, to indicate generally where the lines of discussion in the philosophy of mind should be drawn, and to relate issues in the philosophy of mind to the possibility of artificial intelligence.

## I

Eliminative materialism is the most prominent version of extreme materialism at large today. In its psychological mode, eliminative materialism holds that the concepts of “folk psychology” are “mythical posits of a bad theory,”<sup>7</sup> and are, as such, radically mistaken ways of construing the world of the mind. The eliminative materialist’s position is dominated by the assumption of the ultimate priority of scientific explanation understood in a reductive and physicalistic way. I believe that eliminative materialism in assigning this ultimate priority to scientific explanation generates an ineliminable paradox, for scientific explanation is genetically derived from, and is epistemically parasitic upon, our commonsense ways of going on, and cannot, without absurdity, be used to undermine radically such common-sense ways of going on. I stress “radically,” for I am not claiming that one has to accept everything one finds in common sense precisely as common sense presents it. But the challenge of eliminative materialism is to the entire structure of common-sense psychological concepts and not merely to particular parts of that structure.

Why should we accept this assumption of the ultimate priority of scientific explanation? It does not appear to be a self-evident truth, and it can be, indeed it has been, denied. For example. Bishop Berkeley, in his own peculiar way, rejected this assumption. He denied that the philosophic-scientific conception of material substance could be used to call into question the ordinary modes of cognition upon which it itself was ultimately founded. It is one of the ironies of history, and should be a lesson to us all, that Berkeley, who regarded himself as the apostle of common-sense to the gentiles of proto-scientific materialism, should commonly be regarded as the most extravagant and paradoxical of philosophers!

The nexus of common-sense psychological concepts must, I believe, be accorded a certain primacy. Against the eliminative materialists who generally claim that common

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<sup>7</sup> Stephen P. Stich, *From Folk Psychology to Cognitive Science: The Case Against Belief* (Cambridge, MA: MIT/Bradford, 1983), 10.

sense is just one (decaying!) theory among others and, as such, subject to refutation, I believe that the core of the common-sense conception is not just one theory among others but a conceptual framework which is the very condition of the intelligibility of any theory and which, as such, cannot be rejected without rejecting every other theory as well.<sup>8</sup>

One very common claim by eliminative materialists is that the common-sense conception is explanatorily inadequate. In a famous passage in the *Phaedo*, Plato turns the tables on the physicalists and indicts them on the charge of explanatory failure.<sup>9</sup> When Socrates was young, he had a passion for natural science. He puzzled over the following sorts of questions:

Is it when heat and cold produce fermentation, as some have said, that living creatures are bred? Is it with the blood that we think, or with the air or the fire that is in us? Or is it none of these, but the brain that supplies our senses of hearing and sight and smell, and from these that memory and opinion arise, and from memory and opinion, when established, that knowledge comes?

But, thinking on these things, Socrates became more and more puzzled. Then he heard of Anaxagoras who, it was said, claimed that it is the mind that produces order and is the cause of everything. Alas, poor Socrates was disappointed. When it came to the crunch, Anaxagoras made no use of causation by mind; instead, he “adduced causes like air and aether and water and many other absurdities.” It was as if someone were to claim that,

The cause of everything that Socrates does is the mind—and then, in trying to account for my several actions, said first that the reason why I am lying here now is that my body is composed of bones and sinews, and that the bones are rigid and separated at the joints, but the sinews are capable of contraction and relaxation, and form and envelope for the bones with the help of the flesh and skin, the latter holding all together, and since the bones move freely in their joints the sinews by relaxing and contracting enable me somehow to bend my limbs, and this is the cause of my sitting here in a bent position.

But, as Socrates points out, while such bodily dispositions are obviously necessary conditions of my posture, they are far from being sufficient. The real reason that Socrates is now sitting in prison awaiting execution is not that his bones and sinews are suitably disposed, but rather that he believes it to be more honourable to submit to the penalty imposed by his city than to run away. Socrates does not deny that there can be knowledge of bodily dispositions; he does deny, however, that such a knowledge would be such as to render otiose explanations in terms of reasons.

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<sup>8</sup> Trying to categorise the common-sense conception as just one theory among others is, I suggest, a categorical mistake akin to that committed by the man in Ryle's famous example who, having seen all the colleges and buildings at Oxford wanted to know where the University was. It is also very much like the erroneous interpretation of Aristotle's *Ethics* which situates *eudaimonia*, along with wealth, pleasure, etc. as one co-ordinate good among others.

<sup>9</sup> *Phaedo* 96ff. Popper comments on this in *The Self and its Brain*, 169ff.

Not only is eliminative materialism explanatorily inadequate, it is also self-defeating.<sup>10</sup> The self-defeating character of certain positions in philosophy has often been demonstrated; an illustration of the mode of argumentation involved in such a demonstration can be culled from Aristotle's defence of the principle of non-contradiction in the *Metaphysics*.

There are some who...assert that it is possible for the same thing to be and not to be...[but] this is the most indisputable of principles. Some indeed have demanded that even this shall be demonstrated.... It is impossible that there should be a demonstration of everything.... We can...demonstrate negatively even that this view is impossible, if our opponent will only say something; and if he says nothing, it is absurd to seek to give an account of our views to one who cannot give an account of anything, in so far as he cannot do so. For such a man, as such, is from the start no better than a vegetable. Now negative demonstration I distinguish from demonstration proper, because in a demonstration one might be thought to be begging the question, but if another person is responsible for the assumption we shall have negative proof, not demonstration. The starting point for all such arguments is not the demand that our opponent shall say that something either is or is not for this one might perhaps take to be a begging of the question, but that he shall say something which is significant both for himself and for another; for this is necessary, if he really is to say anything. For, if he means nothing, such a man will not be capable of reasoning, either with himself or with another. But if any one grants this, demonstration will be possible; for we shall already have something definite. The person responsible for the proof, however, is not he who demonstrates but he who listens; for while disowning reason he listens to reason.<sup>11</sup>

A similar dialectical argument can be marshalled against eliminative materialism. I agree with Lynne Rudder Baker when she says that, "To deny the common-sense conception of the mental is to abandon all our familiar resources for making sense of any claim, including the denial of the common-sense conception."<sup>12</sup> She continues, "If the thesis denying the common-sense conception is true, then the concepts of rational acceptability, of assertion, of cognitive error, even of truth and falsity are called into question."<sup>13</sup>

It seems that the eliminative materialist is faced with a dilemma; he must either abandon the assertion of, and the argument for, eliminative materialism, or he must continue to assert and argue for the eliminative materialism. If he abandons claim and argument then he loses by default; if he continues to assert and to argue, then the form of the assertion or argument commends eliminative materialism to our rational faculties

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<sup>10</sup> In connection with such arguments Baker makes the point that "arguments about the allegedly self-defeating character of anything are, I think, frustrating to people on both sides of the issue. People on each side think that those on the other side miss the point. From my side, it seems that I ask straightforward questions...which require answers but receive none." Lynne Rudder Baker, *Saving Belief: A Critique of Physicalism* (Princeton, New Jersey: Princeton University Press, 1987), 137, n.

<sup>11</sup> Aristotle, *Metaphysics*, IV, 4 (1006a2ff).

<sup>12</sup> Baker, *Saving Belief*, 134. For essentially the same argument see Mortimer J. Adler, *What Man Has Made of Man* (New York: Frederick Ungar Publishing Company, 1937), 128-29, n. 4.

<sup>13</sup> Baker, *Saving Belief*, 134.

for evaluation, while the content of that assertion/argument explicitly denies that there can really be such a thing as rational evaluation.<sup>14</sup>

Paul Churchland, in his 1980 article, admits that the self-defeating argument is very popular, and offers a refutation of it by means of a counterexample.<sup>15</sup> Churchland claims that the argument is question-begging in that it assumes a certain theory of meaning which, along with other elements of folk psychology, it is the aim of the eliminativist to call into question. He offers a counterexample to illustrate this alleged question-begging:

The Antivitalist says that there is no such thing as vital spirit. But this claim is self-refuting. The speaker can expect to be taken seriously only if his claim cannot. For if the claim is true, then the speaker does not have vital spirit and must be dead. But if he is dead, then his statement is a meaningless string of noises, devoid of reason and truth.<sup>16</sup>

As both Baker and Popper point out, this alleged counterexample is disanalogous in a significant respect. As Popper puts it,

The argument for vitalism [in the counterexample] relies on the truth of vitalism...thus the desired conclusion is in reality presupposed in the premise and the argument is circular.... In contrast, my argument for indeterminism relies not on the truth of free will but rather on the alleged truth of determinism, from which follows, deductively, the consequence that, if the premise is true, any argument in its favour loses its effectiveness.<sup>17</sup>

He goes on to note that he was not claiming that materialism was false, merely that it is self-defeating in that it cannot be supported by rational argument.

Baker, in her analysis of Churchland's counterexample, holds that both the antivitalist and the vitalist agree that being alive is a necessary condition for making a claim; they differ only in their conception of what it is to be alive. The situation is significantly different for the eliminative materialist. In the first place, he cannot consistently agree with his opponent 'that having beliefs or other attitudes identified by content is a

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<sup>14</sup> Baker puts the dilemma as follows: "From the perspective that denies the common-sense conception, either he [the skeptic] can distinguish being 'justified\*' in 'accepting that p from being 'justified' in 'accepting' that q or not. If not, then one is 'justified' in 'accepting' the thesis that denies the common-sense conception of the mental or any other thesis. But if so, then...the skeptic must absolve himself of the charge that he is covertly assuming contentful states by producing relevant content-free successors to concepts of acceptance and justification." [Ibid., 136.] It is somewhat ironic that Darwin wrote in 1881 that it was his "innermost conviction" that \*the universe is not the result of chance. But then, with me, the horrid doubt always arises whether convictions of man's mind which have developed from the mind of animals are of any great value or at all trustworthy. Would anyone trust in the conviction of a monkey's mind, if there are any convictions in such a mind?" From a letter of July 3, 1881, cited in Francis Darwin's *Charles Darwin: A Life* (London, 1893), 68. For a very similar line of argument directed against the pragmatism of Rorty, the genealogy of Foucault, and the deconstruction of Derrida, from the perspective of contemporary critical theory, see chapters 1-4 of Thomas McCarthy's *Ideals and Illusions: On Reconstruction and Deconstruction in Contemporary Critical Theory* (Cambridge, MA: MIT Press, 1991).

<sup>15</sup> This refutation is the same one provided by P. S. Churchland in "Is Determinism Self-Refuting?" *Mind* 90 (1981): 100, to which Karl Popper replied in "Is Determinism Self-Refuting?" *Mind* 92, (1983): 103-04.

<sup>16</sup> Paul Churchland, "Eliminative Materialism and the Propositional Attitudes," *The Journal of Philosophy* 78 (1981): 89-90. See also Patricia Smith Churchland, "Is Determinism Self-Refuting?" *Mind* 90 (1981): 100.

<sup>17</sup> Popper, "Is Determinism Self-Refuting?" 103.



necessary condition for making claims. The eliminative materialist is not offering a different account of what it is to have beliefs; he is denying that anyone has beliefs.”<sup>18</sup> Baker does not hesitate to call the vitalist/antivitalist counterexample “silly,” noting that the arguments would be parallel if the antivitalist were to hold that dead men make claims. In the second place, the antivitalist counter-argument fails in that whether antivitalism is true or false, the antivitalist cannot be charged with being dead. However, the original argument against the rational assertability of eliminative materialism assumes that eliminative materialism is true, and this can hardly beg the question if the point of the argument is to show that eliminative materialism is rationally non-assertable.

Popper’s argument against materialism<sup>19</sup> may be summarised as follows: the materialist holds that, for example, reasoning consists in “a certain kind of verbal behaviour and in acquiring dispositions to act and to speak.” Natural selection, positive and negative conditioning all play a role, as does schooling, which is just another form of conditioning. Now the materialist, faced with the problem of how to explain a mistake in, for example, logic, will say something like, ““these mistakes are to be explained by reference to the standards of logic, which standards are not abstract principles but merely those standards which the majority of logicians are disposed to accept.” The Popperian interlocutor replies, “Are the logicians so disposed because the principles are valid, or are the principles valid because the logicians are so disposed?” Whichever way the eliminative materialist turns he cannot avoid being impaled on the horns of a dilemma. If logicians are disposed to accept the principles of logic because the principles are valid then the validity of those principles is prior to the dispositions of the logician and cannot be explained in terms of such dispositions; if the principles of logic are valid simply because logicians are disposed to accept them then they lose all normative status. Depending thus on the logicians’ dispositions alone, the principles of logic would have no more standing or authority than any other consensual set of beliefs and could not be used as criteria of correctness in reasoning.<sup>20</sup>

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<sup>18</sup> Baker, *Saving Belief*, 139.

<sup>19</sup> Popper, *The Self and its Brain*, 76-81.

<sup>20</sup> As Morowitz noted “To underrate the significance of the appearance and character of reflective thought is a high price to pay in order to honour the liberation of science from theology by our reductionist predecessors several generations back. The human psyche is part of the observed data of science. We can retain it and still be good empirical biologists and psychologists.” Harold J. Morowitz, “Rediscovering the Mind,” *Psychology Today* (August 1980). Reprinted in Dennett and Hofstadter, *The Mind's I*, (London: Penguin Books, 1982), 34-42. (p. 42)

Baker summarises the cost of the eliminative materialist's project.<sup>21</sup> If eliminative materialism were true, then our ability to predict other people's behaviour becomes inexplicable; commonplace interpersonal interactions becomes mysterious, as does what is said by us about such interactions; behaviour could never go wrong; almost every explanation ever given by an agent for his action would be false; there would be no distinction between telling lies and making honest mistakes; moral judgments would be false, or senseless; nothing would ever have matter to anybody; it would a total mystery, why we say the things we do; it would be a sheer miracle that we are systematically able to utter truths; reports of deliberation and decision would be false; what one does would be totally unrelated to what one reports one is doing; most sorts of psychology would become bogus; and the explananda of psychology would become problematic.

I have now eliminated from consideration both extreme immaterialism and extreme materialism, the former by fiat, and the latter by means of the argument from self-refutation. This leaves the two moderate theories in possession. How, then, are we to discriminate between them? (It should be noted in passing that almost all the current debate in the philosophy of artificial intelligence is a family dispute within the materialist camp, that is, within positions [3] and [4]. Many of the objections to the reductive analysis of intentionality which we find exhibited in [4] come from people such as Chisholm, Price, and latterly, Searle, all of whom inhabit position [3]. To satisfy ourselves that Searle is a materialist of the position [3] variety we have only to note that he has as one of his perennial axioms the following: Brains cause minds and they do so entirely.<sup>22</sup> This is clearly equivalent to holding that the body is both a necessary and a sufficient condition for mind.)

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<sup>21</sup> Baker, *Saving Belief*, 130-33.

<sup>22</sup> This is Premise I in *Minds, Brains and Science* (1984) and Axiom 4 in "Is the Brain's Mind a Computer Program?" *Scientific American*, 262 (January 1990).

## II

Now I want to turn my attention to a positive argument for moderate immaterialism as against moderate materialism. The relevance of this argument to the question of artificial intelligence is that if moderate materialism is tenable then the possibility of a computer's being able to think is much more conceivable whereas if moderate immaterialism is tenable then it becomes very difficult to sustain a plausible argument for artificial intelligence in any interesting sense.

What would an argument against the possibility of a computer's being able to think look like? In very general terms it would have to look something like this:

- Premise 1. Xs [don't] [can't] think
- Premise 2. Computers are Xs
- Conclusion. Computers [don't] [can't] think

In this argument, "computer" can be taken to be unproblematic. "Thinking," on the other hand, if it is to be philosophically interesting, needs to be understood in terms of intellectual knowledge and not just sensation or perception. Classical and mediaeval philosophers, by and large, regarded thinking as the activity of a particular part of the soul. According to this view, thinking comprised three distinct activities; conceptualisation, reasoning, and judging. These activities were together sharply distinguished from sensation/perception. If the argument I am about to present is to succeed at all, the distinction between thought or conceptual knowledge, on the one hand, and perception or sensory knowledge, on the other, must be maintained. How then might the distinction between conceptual and perceptual knowledges be characterised? In this way: knowledge produced by sensation/perception is ineluctably particular; intellectual knowledge is ineluctably universal. Descartes illustrates the distinction between sensation/perception and intellection in the *Meditations* in terms of the distinction between imaginability and conceivability:

When I imagine a triangle, not only do I conceive it to be a figure made up of three lines, but I also, by the strength and interior application of my mind, contemplate these three lines as present • and this is just what I call imagining. But if I want to think of a chiliagon. I can conceive that it is a figure made up of a thousand sides just as easily as I conceive that a triangle is a figure made up only of three sides but I cannot imagine the thousand sides of a chiliagon as I can the three sides of a triangle, for I cannot regard them as present with the eye of the mind. And although, following my habitual mode of imagining corporeal things, I were to represent to my some figure or other confusedly when thinking of a chiliagon, nevertheless it is obvious that this confused figure would not be a chiliagon,

for it would not differ in any way from what I would represent to myself were I to think of a myriagon or any other many-sided figure.<sup>23</sup>

In our argument, then, we are, in classical Aristotelian style, looking for a middle term which will provide the reason which will enable us to assert our conclusion; we are looking not just for the fact, but for the reasoned fact. Now, what could we put for the X in the above argument? Perhaps the middle term could “emotionless beings” or “uncreative beings.” It is difficult to see how one could get a noninvidious argument going along these lines, for the choice of such a middle term immediately prejudices the conclusion. What if the middle term were “physical systems?” This suggestion looks more promising. The problem with this term, however, is soon apparent, for it is far too wide in scope and is susceptible to refutation by counterexample. Human beings are physical systems (at least) and they manifestly think, so any argument which attempts to refute the claim that computers can think at the cost of denying that human beings can think must be deemed to be gratuitously counter-intuitive. What if the middle term were “purely physical system?” This would defeat the counterexample only if we are willing to defend the position that human beings are more than purely physical systems and were prepared to indicate, at least in a preliminary way, what this more might be. What if the middle term were “things which cannot be represent?” This is easily refutable by counterexample. If a book can be said to represent and if such a claim is not obviously incomprehensible, the so too can a computer represent. What if the middle term were amended to “things which cannot originally represent?” This would avoid the counterexample, but at the cost of committing us to some account of what it is for a system to represent originally.<sup>24</sup> We might parse “originally represent” in terms of the

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<sup>23</sup> Rene Descartes, *Meditations Metaphysiques*, (Paris: Librairie Larousse): “Lorsque j’imagine un triangle, non seulement je conçois que c’est une figure composee de trois lignes, mais avec cela j’envisage ces trois lignes comme presentes par la force et l’application interieure de mon esprit; et c’est proprement ce que j’appelle imaginer. Que si je veux penser a un chiliogone, je conçois bien a la verite que c’est une figure composee de mille cotes seulement; mais je ne puis pas imaginer les milles cotes d’un chiliogone comme je fais les trois d’un triangle, ni pour ainsi dire les regarder comme presents avec les yeux de mon esprit. Et quoique, suivant la coutume que j’aai de me servir toujours de mon imagination lorsque je pense aux choses corporelles, il arrive qu’en concevant un chiliogone je me represente confusement quelque figure, toutefois il est tres evident que cette figure n’est point un chiliogone, puisque’elle ne differe nullement de celle que je me representerais si je pensais a un myriogone ou a quelque autre figure de beaucoup de cotes [*Meditation Sixieme*].

<sup>24</sup> Daniel Dennett, in *The Intentional Stance* (Cambridge, MA: MIT, 1989) chapters 7 and 8, has an argument against this position to the effect that the evidence warrants us neither allowing that both human beings and computers originally represent, or that neither human beings nor computers do. The question of original intentionality arises here. His argument appears to run in two directions.

- A. 1. If computers are not original intenders, then neither are human beings,  
2. Computers are not original intenders, therefore  
3. Human beings are not original intenders,

or

possession of concepts (as distinct from precepts). Again, there seems to be some sense in which computers can possess concepts, albeit in a derivative way, so we might have to parse “originally represent” in terms of the generation of concepts. As against this, it might be claimed that while classical AI programs cannot generate concepts, Parallel Distributed Processing programs can.<sup>25</sup> To block this move we should have either to deny that PDP programs can generate concepts (perhaps because the generation of concepts presupposes consciousness and consciousness presupposes life) or accept that they can do so and continue the search for a significant difference.

One point that has to be explained (or explained away) by any reductionist account is the commonsense apprehension of a difference between the physical realm and the psychical realm, the physical realm being constituted by dyadic forms of energy interchange whereas the psychical realm involves, in its cognitive dimension, a triadic relation between the knower, the known, and the means of knowing. Consciousness is often taken to be the characteristic manifestation of the psychic realm. In the next few pages, I shall attempt to show that, from Aristotle to Nagel, philosophers have taken seriously the difference between the realms of the physical and the psychic and have attempted to characterise and account for this difference in remarkably similar ways.

In the treatise, *De Anima*, we find Aristotle discussing what I take to be an incipient notion of consciousness.<sup>26</sup> In the second book of that work, Aristotle seems to give us two accounts of *aisthesis*: in the early chapters of book II *aisthesis* is presented as a kind of alteration or change; in the later chapters (chapter 12 in particular) *aisthesis* is presented as the reception of form without matter.<sup>27</sup> There is much scholarly dispute as to whether these seemingly different accounts of *aisthesis* really are different, or whether they are complementary aspects of a unified whole. I incline to the latter interpretation. Now the alteration account of *aisthesis* is clearly a version of what I have been calling dyadic energy

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- B. 1. If computers are not original intenders, then neither are human beings  
2. Human beings are original intenders, therefore  
3. Computers are original intenders.

Dennett seems to be forcing us to accept either that neither machines nor human beings are original intenders, or that both machines and human beings are original intenders.

<sup>25</sup> D. E. Rumelhart, J. L. McClelland and the PDP Research Group, *Parallel Distributed Processing: Explorations in the Microstructure of Cognition Vol. 1, Foundations* (Cambridge, MA: MIT Press, 1986).

<sup>26</sup> See, however, the introduction to the Penguin Classics' version of the *De Anima*, translated and introduced by Hugh Lawson-Tancred, who considers such attempts to detect an account of consciousness in Aristotle to be irremediably anachronistic.

<sup>27</sup> The Greek term *aisthesis* covers not only what would be referred to in English as either sensation or perception, but also what we would term consciousness. This is one of those very rare cases in which English makes more verbal and, one hopes, real distinctions than does Greek..

interchange, and it goes without saying that some such process is necessary if *aisthesis* is to take place. The form-without-matter account of *aisthesis*, while being compatible with the alteration account, goes beyond it. In this account Aristotle is establishing the fairly obvious point that in grasping an entity cognitively, one does not receive in the cognitive power everything that pertains to that entity in reality, just its formal dimensions. It is quite true to say of Aristotle, as some commentators do, that in the sensory organ receives an entity's form without that entity's matter but with the matter of the sensitive organ. However, if this is taken to be all that happens in *aisthesis* then one must quarrel with the commentators. If the form received from an entity informs the sensitive organ in precisely the same way in which it informs the entity, then a mere physical change has taken place in the sense organ which would then become that entity in a physical manner. But, as Aristotle is at some pains to point out, the sense organ does not become the sense object in all its physical reality. What is unique to the change or alteration that is *aisthesis* is that something, call it awareness, call it consciousness, supervenes upon the undeniable physical immutation which takes place in the sense organ. The physical immutation of the sense organ, then, is clearly a necessary condition of *aisthesis*, but it is not at all obvious that it is its sufficient condition. So far as the evidence will take us it seems that only living beings are capable of becoming cognitively aware of their environment consequent upon the requisite physiological stimulation. The sun shines indifferently upon me and upon a rock and warms us both, but only I am cognitively aware of the sun.

Whatever problems there may be in arguing for the necessity of a supra-physical cognitive capacity on the level of *aisthesis*, when it comes to the operation of mind or intellect Aristotle is in no doubt whatsoever that it is essentially an immaterial capacity.

Mind in order to know must be pure from all admixture; for the co-presence of what is alien to its nature is a hindrance and a block: it follows that it too, like the sensitive part, can have no nature of its own, other than that of having a certain capacity. Thus, that in the soul which is called mind (by mind I mean that whereby the soul thinks and judges) is, before it thinks, not actually any real thing.<sup>28</sup>

Aristotle's account is not merely of historical interest. In 1953 Michael Scriven held that the capacity for complex behaviour is a necessary but not a sufficient condition for consciousness. He held then that from our experience we hold that life too is a necessary condition of consciousness, and hence, that while we can decide if living things are conscious on the basis of their behaviour, we cannot do this for non-living things. The

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<sup>28</sup> *De Anima*, 429a18n1

paradox lies in the fact that while the behaviour of human beings seems to be duplicable, there nevertheless seem to be descriptions of human behaviour which can never properly be applicable to machines. Scriven believed that this paradox could be resolved by noting that while human beings have no transcendent element, neither can machines ever be conscious because, as he puts it, “we have come to see that a reproduction of a man sufficiently exact to be conscious is too exact to be still a machine.” He goes on to note that, “Consciousness is not a property which can be detected in a machine by any physical examination, because it cannot be identified with any physical characteristics of a machine. Nor can it even be correlated with them, as the colour red can be correlated with certain wavelengths of light.”<sup>29</sup>

In his seminal article, “Computing Machinery and Intelligence,” Turing considered an objection to the possibility of a computer’s being able to think based on its alleged incapacity to be conscious.

Not until a machine can write a sonnet or compose a concerto because of thought and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain—that is, not only write it, but know that it had written it. No mechanism could feel (and not merely artificially signal, an easy contrivance) pleasure at its successes, grief when its valves fuse, be warmed by flattery, be made miserable by its mistakes, be charmed by sex, be angry or depressed when it cannot get what it wants.<sup>30</sup>

While unwilling to accept this argument as having any force against his “imitation game” Turing does admit that he does not wish “to give the impression that I think there is no mystery about consciousness. There is, for instance, something of a paradox connected with any attempt to localise it.”<sup>31</sup>

The most well known defender of the claim that consciousness must be taken seriously in any account of genuine knowledge is Thomas Nagel. He writes,

While an account of the physical basis of mind must explain many things, this [consciousness] appears to be the most difficult. It is impossible to exclude the phenomenological features of experience from a reduction in the same way that one

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<sup>29</sup> See Scriven, p. 36, and p. 39. See also J. R. Lucas who, in “Minds, Machines and Godel” argues that Godel’s theorem proves that Mechanism is false. He says that. The paradoxes of consciousness arise because a conscious being can be aware of itself, as well as of other things, and yet cannot really construe as being divisible into parts. It means that a conscious being can deal with Godelian questions in a way in which a machine cannot, because a conscious being can both consider itself and its performance and yet not be other than which did the performance. A machine can be made in a manner of speaking to ‘consider’ its own performance, but it cannot take this ‘into account’ without thereby becoming a different machine, namely the old machine with a ‘new part’ added. But it is inherent in our idea of a conscious mind that it can reflect upon itself and criticize its own performances, and no extra part is required to do this: it is already complete, and has no Achilles heel.” [p. 57]

<sup>30</sup> Alan Turing, “Computing Machinery and Intelligence,” in Alan R. Anderson (ed.). *Minds and Machines* (Englewood Cliffs, N. J.: Prentice-Hall, 1964), 17. Turing’s paper was originally published in *Mind* 59 (1950). The argument cited by Turing is taken from Professor Jefferson’s “Lister Oration.”

<sup>31</sup> Turing, “Computing Machinery and Intelligence,” 18.

excludes the phenomenal features of an ordinary substance from a physical or chemical reduction of it — namely, by explaining them as effects on the minds of human observers (cf. Rorty 1965). If physicalism is to be defended, the phenomenological features must themselves be given a physical account. But when we examine their subjective character it seems that such a result is impossible. The reason is that every subjective phenomenon is essentially connected with a single point of view, and it seems inevitable that an objective, physical theory will abandon that point of view.<sup>32</sup>

It seems clear from the foregoing that a central element of the task of the defender of artificial intelligence will be to separate the notion of consciousness from that of knowing. If this can be done the idea of artificial intelligence becomes much more plausible. Can this separation be effected in such a way as to retain a rich and philosophically interesting concept of thought? I do not think so. Knowledge without consciousness is Hamlet without the Prince!<sup>33</sup>

Leaving to one side the question of whether and to what extent sensory cognition demands the presence within the knower of a supraphysical capacity, and shelving for the time being considerations having to do with the intrinsic relation between consciousness and knowledge, I wish now to present in brief an argument to the effect that such a supra-physical (or immaterial) capacity is a *sine qua non* for intellectual knowledge. As this argument has been around, in one form or another, for quite some time (it has its roots in the writings of Aristotle and St. Thomas) I am obviously making no claim to originality. In the form in which I present it here the argument is immediately derived from a presentation by Mortimer Adler.<sup>34</sup>

The argument in its bare bones hinges on two propositions. The first proposition asserts that the concepts whereby we understand what different kinds of classes of things are like consists in meanings or intentions that are universal. The second proposition asserts that nothing that exists physically is actually universal; anything that is embodied in matter exists as an individual; and as such it can be a particular instance of this class or that. From these two propositions, the conclusion follows that our concepts must be immaterial. If they were acts of a bodily organ such as the brain, they would exist in matter, and so would be individual; but they are universal; hence they do not and cannot exist in matter, and the power of conceptual thought by which we form and use concepts must be an immaterial power, i.e., one the acts of which are not the acts of a bodily organ.<sup>35</sup>

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<sup>32</sup> Thomas Nagel, "What is it Like to be a Bat?" *The Philosophical Review* 83 (1974). Reprinted in Hofstadter and Dennett's *The Mind's I* (London: Penguin Books, 1982).

<sup>33</sup> A possible objection to my linking of consciousness and knowledge can, in these post-Freudian days, be mounted on the basis of the possibility of unconscious knowledge. I would, as a matter of fact, be prepared to accept the possibility of such unconscious knowledge, but only as essentially related to and as ultimately derived from consciousness in the first place. For an idea of the position which I would in essence defend in this regard, see n. 55, 218-24 of Mortimer Adler's *What Man Has Made of Man* (New York: Frederick Ungar Publishing Co., 1937).

<sup>34</sup> Mortimer Adler, "Intentionality and Immateriality," *The New Scholasticism* 41 (1967): 312-44; The Immateriality of Conceptual Thought," *The New Scholasticism* 41 (1967): 489-97.

<sup>35</sup> Adler, "Intentionality and Immateriality," 336. Adler notes rather tartly that "So far as I can judge from my own fairly extensive reading of contemporary literature on this subject, the argument is totally unknown." As an instance of this ignorance he cites Feigenbaum and Feldman's claim in *Computers and*



The argument in this passage is more complex than Adler would have us believe. If we examine the passage we can see that in fact Adler is presenting the argument in two distinct forms. In its first form it is a categorical syllogism; in its second, a hypothetical syllogism. Let us set it out explicitly in both forms.

*Categorical Syllogism:*

1. No physical being is actually universal
2. Concepts are actual universals, therefore
3. Concepts are not physical beings.

This syllogism is Cesare, and is valid.

*Hypothetical Syllogism:*

4. If a concept were an act of a bodily organ, it would exist in matter and hence be individual.
5. A concept is universal (i.e., not individual), hence,
6. A concept is not an act of a bodily organ.

This argument is again valid (by Modus Tollendo Tollens.)

The conclusions of both arguments (3) and (6) are effectively equivalent and we may treat them as one, namely, (6) “a concept is not an act of a bodily organ.” From this conclusion, Adler draws as a corollary the point he really wants to establish, namely that

7. The power of conceptual thought (the power by which we form and use concepts) is an immaterial power.

This, however, is not equivalent to (6), nor is it immediately obvious how we might derive it therefrom. One way to do it appears to be as follows. We can immediately conclude from (6), by means of eduction by complex conception that,

8. That power whose acts are concepts is not a power whose acts are the acts of a bodily organ.<sup>36</sup>

If we now define “immaterial power” as “a power the acts of which are not the acts of a bodily organ,” we can generate,

9. That power whose acts are concepts is an immaterial power.

If we accept what would seem to be a self-evident truth, namely that,

10. The power of conceptual thought is the power whose acts are concepts

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*Thought* (New York, 1963), 8, that no evidence, argument, or proof has ever been advanced against the possibility of a computer's eventually becoming able to do whatever it is that a human mind does.

<sup>36</sup> In a fully developed argument it would be necessary to distinguish clearly between the ontological, the psychological, and the logical dimensions of human knowledge..

and substitute appropriately in (9) then we have

(7) the power of conceptual thought is an immaterial power.

Those who would refute this argument must show either that it is invalid, or that it is unsound. It appears to be valid, and I take it to be so. Whether or not it is sound depends upon the truth of its premises, and I cannot establish that here.

### III

What is the relevance of this argument for moderate immaterialism to the topic of artificial intelligence? Simply this: If conceptual knowledge is the product of an immaterial power, and if this immaterial power virtually requires (while yet transcending them) the properties of life and consciousness, then there is no cogent support for the view that computers, which are non-living, non-conscious entities, entities which give, moreover, no evidence of an ability to form or employ concepts, will ever be able to know in anything like a human sense.

The improbability of discovering that computers can think is underscored by the failure to discover in chimpanzees a capacity for prepositional language, despite the fact that chimpanzees, unlike computers, are alive, are conscious, are possessed of obvious cognitive powers, and have been the beneficiaries of intensive and exhaustive training, the like of which is given to no human infant. Impressed by the ability of vocally incapacitated human beings to communicate with others by means of signs, the eighteenth century philosopher de la Mettrie, had the following inspiration:

Would it be absolutely impossible to teach this animal [the ape] a language? I do not think so. I should choose a large ape in preference to any other, until by chance another kind should be discovered, more like us, for nothing prevents there being such a one in regions unknown to us....I should not want it to be too young or too old; for apes that are brought to Europe are usually too old. I would choose the one with the most intelligent face, and the one which, in a thousand little ways, best lived up to its look of intelligence....apes see and hear, they understand what they hear and see, and grasp so perfectly the signs that are made to them, that I doubt not that they would surpass the pupils of Amman [Johann Conrad Amman, 1669-c. 1730] in any other game or exercise. Why then should the education of monkeys be impossible? Why might not the monkey, by dint of great pains, at last imitate after the manner of deaf mutes, the motions necessary for pronunciation?<sup>37</sup>

When the idea of investigating the possibility of an animal's speaking was rediscovered in the twentieth century, attempts were made to get chimpanzees to vocalise. The result was

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<sup>37</sup> Julien Offray de la Mettrie, *Man a Machine*, (Leyden, 1748; Open Court French-English edition, 1912), 100-01.

a miserable failure.<sup>38</sup> De la Mettrie's research strategy was rediscovered by the Gardners, by D. Premack, and by D. M. Rumbaugh in the 1960s. Various sub-strategies were devised. The chimpanzee Washoe was allegedly taught a version of American Sign Language (Ameslan); Lana was taught to enter sequences at a console; and Sarah was taught to manipulate items on a visual display. The early reports were astounding; it seemed as if the chimps were able to manifest a linguistic ability comparable to that of children. However, as time passed and the initial flurry of excitement subsided significant differences emerged in the interpretation accorded to the chimpanzees' activities. For example, some researchers began to modify their original claims regarding the chimpanzee's linguistic ability. In 1977, Rumbaugh was claiming for chimpanzees not language but what he called the requisites of linguistic competence.<sup>39</sup> And in 1976 Premack began to replace talk of language with talk of the cognitive preconditions of language.<sup>40</sup> Other researchers continued to produce enthusiastic reports. Some critics, while they were prepared to grant that the apes manifested some linguistic skills, nevertheless, considered them to be trivial. Other critics questioned the validity of the data on the chimpanzee's performances. According to some, experiments were not accurately described.<sup>41</sup> This was perhaps more the case with earlier reports than with later ones. One major line of criticism alleged that the methodological inadequacies of these experiments (for example, the problem of cueing) were either insuperable or else sufficiently endemic to invalidate many of the reports.<sup>42</sup> Inadequate or partial reporting of experimental circumstances was a very serious problem with the sign-language projects. According to Seidenberg, the reports of Washoe, Koko are anecdotal and

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<sup>38</sup> K. J. Hayes and C. Hayes, "The Intellectual Development of a Home-Raised Chimpanzee," *Proceedings of the American Philosophical Society* 95 (1951), 105-09. A useful anthology of articles in this area is Thomas A. Sebeok and Jean Umiker-Sebeok (eds.), *Speaking of Apes: A Critical Anthology of Two-Way Communication with Man* (New York and London: Plenum Press, 1980). This collection contains articles by Kellogg, Lenneberg, Brown, Bronowski & Bellugi, McNeill, Mounin, Terrace & Bever, Limber, Rumbaugh, Fouts & Rigby, Gardner & Gardner, Chomsky, and others. Also, see Martin Gardner, "How Well can Animals Converse?" *Semiotica* 38 (1982): 357-67; Robert J. McLaughlin, "Language and Man: Aristotle Meets Koko," *The Thomist* 45 (1981): 541-70; and Mark S. Seidenberg, "Aping Language," *Semiotica* 44 (1983): 177-94.

<sup>39</sup> D. M. Rumbaugh (ed.), *Language Learning by a Chimpanzee: The Lana Project* (New York: Academic Press, 1977).

<sup>40</sup> D. Premack, *Intelligence in Ape and Man* (Hillsdale, NJ.: Lawrence Erlbaum Associates, 1976).

<sup>41</sup> C. A. Risteau and D. Robbins, "A Threat to Man's Uniqueness? Language and Communication in the Chimpanzee," *Journal of Psycholinguistic Research* 8(1979): 267-300; H. S. Terrace, "Is Problem-Solving Language?" *Journal of the Experimental Analysis of Behavior* 31 (1979): 161-75; M. S. Seidenberg and L. A. Petitto, "Signing Behavior in Apes: A Critical Review," *Cognition* 7, (1979), 177-215.

<sup>42</sup> Thomas A. Sebeok and Jean Umiker-Sebeok (eds.), *Speaking of Apes: A Critical Anthology of Two-Way Communication with Man* (New York, 1980).

unsystematic.<sup>43</sup> Another line of criticism alleged that there were conceptual inadequacies of various kinds operating in the research. An example of one such problem was the very peculiar practices of scoring Washoe correct in her answers if they were in the correct category. For example, if she were asked to select, say, a banana, and she actually selected an apple, this response counted as correct, because bananas and apples were taken to belong to the same category! Still another line of criticism, applying a version of Ockham's razor, claimed that the chimpanzees' behaviour could be adequately interpreted without attributing linguistic skills to them.

The most serious problem, from a philosophical point of view, is what has been called the "Clever Hans" effect. In a Clever Hans situation, an animal is trained to produce a form of behaviour which is uncharacteristic for that species and appears, moreover, to be of a kind which is specifically human. Now, the problem with a comparative study of behaviour is that the researcher can always find a point of comparison provided only that the desired form of activity is defined in a sufficiently narrow way. If all that matters is the output of the entities to be compared, and if a sufficiently constrained definition of what constitutes a certain kind of activity is accepted, then there is no difficulty in identifying the two behaviours as being of the same kind.

Hans could be said to be able to add if we merely define this skill as 'being able to indicate the amount that results when two numbers are added together.' Similarly, Skinner's ping-pong playing pigeons could be said to play the game if it is narrowly conceived as \*being able to volley a certain type of spheroid across a net.' In just this way, apes are said to have acquired language, or the 'rudiments of linguistic skill,' because of the crude signing behaviours they display.<sup>44</sup>

But, as Seidenberg goes on to point out

These animals could be said to possess the relevant human skills (being able to add, play ping-pong, talk) only if they are construed so narrowly as to ignore their important aspects. Characteristically, a person who can add is not dependent on cues from other people (as was Hans); the person who plays ping-pong keeps score and tries to win (unlike a pigeon); the person who talks does not merely emit signs, but rather follows a large set of linguistic and social conventions (unlike apes).

This switch between literal and metaphorical uses of terms we may call "creeping literalism." A term which is used paradigmatically in a human context, such as "language," is applied to a specified range of animal behaviour, originally in a

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<sup>43</sup> Seidenberg, "Signing Behavior in Apes," 183-84

<sup>44</sup> Seidenberg, "Aping Language," 187.

metaphorical (or at best analogical) sense. Soon, however, the quotation marks disappear, and the originally metaphorical or analogical use of the term has now become literal.<sup>45</sup>

Michael Scriven notices this problem too. “At first as slang, then seriously, these machines will be called intelligent.”<sup>46</sup> In such a case, Scriven argues that the word has changed its meaning if considered to be applicable to computers. He notes that a machine operated by an intelligent being does not thereby become intelligent, any more than the human brain, which is a physiological organism. It is the creature which is intelligent not its brain. The ape researchers cannot have it both ways. If they begin by investigating whether apes possess the skill which in humans is termed “naming” then it becomes obvious that the apes differ from more than they resemble humans. If the skill is operationally defined in some restricted way, then the evidence for the ape’s possession of it is much higher; now, however, it no longer is significantly similar to what human beings do. I suggest that the failure of the research project to discover specifically humanoid intelligence in chimpanzees, despite their possession of life and consciousness (which I take to be necessary conditions of intelligence) underscores the radical implausibility of the research project to discover humanoid intelligence in machines, which are neither living nor conscious.

To conclude: if the moderate immaterialist position in the philosophy of mind is more defensible than the moderate materialist position, then, given the presence of life and consciousness in all the entities which we would unequivocally recognise as capable of exercising knowledge, life and consciousness could then reasonably be held to be a necessary condition of cognition. If this is so we have no reason to believe that a computer will ever be able to know, unless it too becomes capable of life and consciousness. Furthermore if, as the moderate immaterialist position claims, an immaterial power is an additional necessary precondition of intellectual knowledge in material beings, then we have no reason to suppose computers will ever become capable

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<sup>45</sup> Dennett presents an account of three stances which we can adopt towards any complex system; physical, design, and intentional. No problem arises with his notion of a physical stance. If we adopt the design stance we refer to the intentions or purposes of the designer of the artifact. Again, this is unproblematic. It is with the notion of an intentional stance that the problem of creeping literalism can occur for this involves alluding to the “intentions” of the entity under scrutiny.

<sup>46</sup> Michael Scriven, “The Mechanical Concept of Mind,” *Mind* 62 (1953): 36; reprinted in Alan Ross Anderson, *Minds and Machines* (Englewood Cliffs, New Jersey, 1964).

of such knowledge unless it can be shown that computers are capable of becoming, in effect, human.<sup>47</sup>

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<sup>47</sup> A parallel approach to the problem I have been dealing with here is the one bearing on what is called “propositional attitudes.” I cannot deal with it here, except to say that the classical view accounts for cognitive content by means of the notion of form. Form determines both the knower and the known though it does so in distinctly different ways. Because it is the principle of both it can serve, on the one hand, to inform matter and be co-constitutive real being, and, at the same time, inform the cognitive powers and be co-constitutive of knowledge.

Our account has to explain how our knowledge is at once ours, and yet is about something other than ourselves. The notion of form, and the theory of abstraction and the role of the phantasmata in cognition, go some way towards supplying an explanation. Thought has to be “of” its objects, and yet it must “belong to” the thinker. A balance must be maintained between these two cognitive demands in any adequate theory. Over-emphasis on the “of” results in a form of sensism tied so closely to the world that it simply seems to be a form of elaborate reaction to circumstances with no genuine cognitive element; over-emphasis on the “belong to” ends up in constructivism.

On the Physical Symbol System Hypothesis or any of its latter day equivalents, how is intentionality possible? A thing is a thing. By itself, it is not “of” or “about” anything. Nothing is gained by piling things higher and higher, or in more complex shapes or patterns; what is required is something different, not more of the same. For more on intentionality, see Gerard Casey “Intentionality and Immateriality,” in Fran O’Rourke (ed.) *At the Heart of the Real* (Dublin: Irish Academic Press, 1992), 97-112.