



Minds and Brains: Angels, Humans, and Brutes

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• Part 2 •

Human beings, other animals and intelligent machines

There is no question that in many behavioral respects we differ from other animals only in degree. Nor is there any question that the human brain differs from the brains of the higher mammals in degree—in complexity and in the ratio of brain weight to body weight.

There may be some question as to whether human and animal brains also differ in kind. I would like to leave this question for you to answer. For example, is the asymmetry of the human brain's left and right lobes uniquely human? Is the absence in animal brains of anything like the motor center for speech, which seems to be connected with cortical asymmetry, a difference in kind? Is the special character of the very large frontal lobe of the human brain another indication of a neurological difference in kind?

Whatever answers you give to these questions should be considered in the light of what I am now going to say about behavioral differences in kind between humans and brutes. Here are the differences between humans and brutes that I think are differences in kind, not in degree. Whether these differences in kind are superficial or radical remains to be seen.

So far as we can tell, animals are capable only of perceptual thought, whereas humans are capable of conceptual thought, which appears totally absent in animals. Conceptual and syntactical speech, with a vocabulary of words that refer to imperceptible and unimaginable objects, together with the way in which humans learn speech, is one indication of this. It is unrefuted by all the recent work on so-called speech by chimpanzees and bottle-nosed dolphins. So far as we can tell, animal perceptual thought, involving perceptual abstractions and generalizations, cannot deal with any object that is not perceptible, or that is not perceptually present. Human conceptual thought, in sharp contrast, deals both with objects that are not perceptually present and with objects that are totally imperceptible—with angels, for example.

This basic difference between perceptual and conceptual thought, and the fact that man alone seems to possess the power of conceptual thought, explains many other differences between human and animal behavior. Man is the only animal with an extended historical tradition and with cultural, as opposed to merely genetic, continuity between the generations. Man is the only animal that makes laws and constitutions for the associations he forms. Man is the only animal that makes machinery and that produces things by ma-

chinofacturing. None of these things, and others like them, would be possible without conceptual thought and conceptual speech.

If I am right concerning the existence of behavioral differences in kind between humans and brutes, we must face the question that still remains: Is this difference in kind superficial or radical? Can it be explained in terms of differences in degree between human and animals? If so, it is only superficial. If not, it is radical.

One other condition must be satisfied in order for us to conclude that the difference is only superficial. The differences in degree between human and animal brains must itself provide us with an adequate explanation of the apparent difference in kind between human and animal behavior.

Let me table that question for a moment in order, first, to consider the human mind in relation to the machines that are supposed to embody artificial intelligence and are supposed to differ in degree only from human intelligence. I do this because it will have a critical bearing on the ultimate question to be resolved.

Here the most important things to point out are that the difference between the human brain and the artifacts supposedly endowed by their makers with intelligence lies in the fact that the latter are purely electrical networks, whereas the human brain is a chemical factory as well as an electrical network, and that the chemistry of the brain is indispensable to its electrical operation.

The extraordinary researches of the last thirty years have shown us how important the chemical facilitators and transmitters are to the operations of the human brain. These are absent from the functioning of artificial intelligence machines so far, though there is now some movement in the direction of creating what are called "wet computers." Until that is fully realized, there will remain a difference in kind between the human brain and computers, one that would not be removed even if machines could be constructed that had electrical units and connections in excess of ten raised to the eleventh power.

The Turing game

If the dream of wet computers is not fully realized, neurophysiology may some day be able to explain human thought, but we will never be able to construct a machine, no matter how complex and refined electrically, that will think the way that human beings do. We can train dogs and horses to do very complicated and remarkable tricks that have nothing to do with their possessing intelligence of the sort that any human being has. So, too, we can program computers to do even more complicated and more extraordi-

nary tricks that are amazing counterfeits of human thought, but this does not mean that they have the power of human thought, or that they are reflexively aware *that* they are thinking and know *what* they are thinking.

If the only difference between men and brutes was the relative size and complexity of the nervous machinery, aided and abetted by the products of brain chemistry, then wet computers might be constructed to think as well as men, if not better, especially if future computers exceed the human brain's componentry by some power greater than ten raised to the eleventh power and if something analogous to all the human brain's chemical agents is operative in a so-called wet computer.

However, if the difference between men and brutes is not purely a quantitative difference in brain weight and complexity, relative to body size and weight; if, instead, the difference between the perceptual power of brutes and the conceptual power of humans stems from the presence in man of an immaterial factor—the human intellect that cooperates with the brain but whose operations are not reducible to brain processes—then no computer, regardless of how extensive its componentry and how chemically assisted its electrical circuitry is, will ever be able to think, to engage in conceptual thought as human beings do.

As Descartes said centuries ago, *matter cannot think*. The best computer that ever can be made by man will always be, electrically and chemically, nothing but a material thing. That is why the test proposed by A. M. Turing—a test to discover whether computers will ever be able to think in human fashion—is so interesting and so significant. It is an answer to Descartes' challenge to the materialists of his day, defying them to build a machine that could think intellectually.

The Turing game is the only critical test that I know whereby to determine whether computers can think in the way in which human beings think, A. M. Turing, by the way, was the somewhat mad English genius who broke the German enigma code.

The Turing test is based on the following game as a model. An interrogator stands in front of a screen behind which are a pair of male and female human beings. The interrogator, by asking them questions and considering the answers they give in written form, must try to determine which one of the persons is a male and which a female. The persons behind the screen must do their intelligent best to deceive the interrogator. If they do their intelligent best, they will succeed. The interrogator's determination will be no better than a guess on his part—fifty percent right, fifty percent wrong.

Now, says Turing, place a human being and a computer behind the screen, and let the computer have what Turing calls merely infant or initial programming.

Infant programming can be of two sorts. (1) Our own infant programming consists of the relatively small number of spinal or cerebrospinal reflexes with which we are born. Other animals, with more or less elaborate instinctive patterns of innate preformed behavior, have much more elaborate infant programming of this sort than humans do. Analogous to such infant programming would be the programming of a computer to give preformed responses to certain definite stimuli.

Let us suppose that the computer's infant programming greatly exceeded man's infant programming in the form of innate reflexes. No matter how large the number of preestablished responses to stimuli programmed into the computer, that number— N —would never be large enough for the computer to pass the Turing test to be described below; for though the computer could be programmed to answer N questions, there would always be the $N + 1$ question, and more after that, which the computer would be unable to answer.

(2) The other sort of infant programming that humans have consists in their innate abilities to learn, among which, for example, is their ability to learn to speak any language whatsoever, or their ability to think about any subject whatsoever within the range of all possible thinkables. To pass the test proposed by Turing, a machine would have to have this second kind of infant programming, and have it to a degree that at least equaled its possession by human beings.

No computer yet built has such programming. All have much more infant programming of the first sort than humans have, but none yet has the second kind of infant programming. Until a computer does, it will fail to deceive the interrogator. By asking questions beyond the range of N , no matter how large N is, the interrogator will always be able to detect which answer came from a machine and which from a human being.

I am betting that a machine with programming of the second sort will never be built and so no machine will ever successfully pass Turing's test. If I turn out to be wrong about this—and only the future will tell—then I will concede that machines can think the way human beings do, and that physical processes, whether merely electrical or electrochemical, can provide us with an adequate explanation of human conceptual thought as well as of animal perceptual thought.

Before I go on, let me call your attention to three matters that are connected with or emerge from our consideration of the Turing test.

The first is the historic fact that the seventeenth-century philosopher, Descartes, anticipated Turing by proposing a similar test to show that machines—and animals, which he regarded as machines with senses and brains but without intellects—cannot think. It was a conversational test. No machine will ever be built, Descartes said, that will be able to engage in conversation in the way in which two human beings engage in conversation that is infinitely flexible and unpredictable in the turns that it will take.

Second, whether or not a Turing machine, contrary to Descartes' prediction, will ever be built, it is certainly clear that no talking chimpanzee or dolphin, using its sign language, could ever pass the Turing test of being indistinguishable from a human being behind the screen.

Third, whether you think that the difference in kind between humans and brutes is only superficial depends on your predicting that neurophysiology will *someday* be able to explain how human beings perform distinctively in the Turing game. Does the power of the human brain account for their distinctive performance? Or is some other factor—some immaterial factor, such as Descartes thought the human intellect to be—needed to explain it?

Minds and brains

We have already encountered two extreme views of the relation of the human mind or intellect to the human brain. At one extreme, there is the materialist who denies not only the reality but also the possibility of immaterial beings, powers, or operations. On this materialist view, brain action and processes provide the necessary and also the sufficient conditions for all mental operations, human conceptual thought as well as animal perceptual thought. This view has come to be called the identity hypothesis. The word *identity* signifies that mind and brain are existentially inseparable. The word *hypothesis* concedes that it is an unproved—and, I think, also unprovable—assumption.

The identity hypothesis takes two forms, one more extreme than the other. The more extreme form is known as “reductive materialism.” It claims that there is not even an analytical distinction between the action of the mind and the action of the brain. The less extreme form—in my judgment much more in accord with the indisputable facts—admits that any description of brain processes is always analytically distinct from any description of mental proc-

esses; we do not use the same terms in both cases, and cannot. This is just as true of animal perceptual thought as it is true of human conceptual thought. Conceding the analytical difference between brain processes and thought processes, this less extreme form of materialism nevertheless insists that mind and brain are existentially inseparable, and so brain action should be able to explain all acts of the mind, both conceptual and perceptual. On this hypothesis, tenable in its less extreme form, neurophysiology should be able to succeed in explaining all aspects of human intelligence as well as all aspects of animal intelligence. The furthest reaches of human thought should not escape its explanatory powers.

At the other extreme, there are the immaterialists who deny that brain processes can now, or will ever be able to, explain human thought. On this view, brain action is not even a necessary, much less a sufficient condition, for thought. This immaterialist view takes its most extreme form in the philosophy of Bishop Berkeley, who denied the very existence of matter and, therefore, regarded humans as purely spiritual creatures, no less spirits than the angels in heaven.

The extreme form of immaterialism flies in the face of indisputable facts, just as the extreme form of materialism does. We should, therefore, have no hesitation in rejecting both of these extremes. The less extreme form of immaterialism is, as we have already observed, the Platonic and Cartesian view of the rational soul or the human intellect as an incarnate angel, somehow incarcerated in a human body purely spiritual substance dwelling in a body that it in no way needs for its essential operation, which is rational thought. Just one fact—and one negative fact is always quite sufficient—casts grave doubt on the Platonic and Cartesian view. Angels, as I pointed out, never sleep. Their intellects are always active. Human beings do fall asleep and wake up. Their intellects are sometimes inactive. We may dream from time to time, but we are not always thinking. That fact is inexplicable on the Cartesian and Platonic view of the intellect's relation to the human body and brain.

In between these two extreme views, each in its several forms, lies the only view that recommends itself to me as fitting all the facts we know. It fits everything we know about the nature of human thought and about the limitations of matter and its physical properties. I would describe this middle view as a moderate materialism combined with an equally moderate immaterialism.

Its moderate materialism consists in its accepting two tenets held by the less extreme form of the identity hypothesis. The first of these tenets is that brain processes and mental processes are analytically distinguishable. No description of the one can ever be

substituted for a description of the other. It also agrees that brain processes are at least a necessary condition for the occurrence of mental processes—something that is denied by the extreme forms of immaterialism.

The middle view that I espouse is also materialistic to the extent that it concedes that every aspect of perceptual thought, in humans as well as in other animals—all the acts of sense perception, imagination, and memory, as well as emotions, passions, and desires—can be or will someday be explained entirely in neurophysiological terms. There is nothing immaterial or spiritual about any of the behavioral or mental operations that are common to human beings and other animals.

What is immaterialistic about this middle view—and quite moderately immaterialistic, in my judgment—can be summed up by saying that human thought (that is, distinctively conceptual thought) cannot now, and never will, be explained in terms of brain action. Nor can the freedom of the human will—the freedom of choice that is distinctively human—ever be explained in terms of physical causation or the motions of material particles.

In other words, without the acts of perception, imagination, and memory, all of which are acts of the sense organs and the brain, conceptual thought cannot occur. Mental pathology and disabilities, aphasias of all sorts, senile dementia, and so on, indicate plainly the role of the brain in the life of the mind. But that is a limited role.

Perhaps the most precise way of summarizing this middle view is as follows. We see with our eyes and with the visual cortex of the brain. We hear with our ears and with the acoustical cortex of the brain. But what organ do we think with? What is the organ of conceptual thought? The middle view answers: *not with the brain*. We do not think conceptually with our brains, even if we cannot think conceptually without our brains. In short, the brain is a necessary, but not the sufficient, condition of conceptual thought. On this one crucial point, the middle view differs from the less extreme form of the immaterialist or the non-identity hypothesis—the view of Plato and Descartes.

This means that an immaterial factor or power—the human intellect and will—is involved in cooperation with the human brain in the production of conceptual thought and free choice. And this if true, as I think it is, means that the difference in kind between human beings and other animals, not to mention machines, is a radical, not a superficial, difference in kind.


It also means that mankind occupies a position on the boundary

line between the whole realm of corporeal creatures, and the realm of spiritual beings, the angels and God, whether these be regarded as mere possibilities or are believed in as actual. But mankind, in this middle position, does not straddle the line that divides the material from the spiritual, with one foot in each realm, as Plato and Descartes would have us think. Mankind is mainly in the realm of corporeal things, but by the power of his immaterial intellect, he is able to reach over into the spiritual realm.

Concluding reflections

Permit me a few concluding reflections. I am relatively certain of only two things. One is that failure to concede the indispensable role of the brain in human thought is an angelistic fallacy that must be rejected. The other is that the materialistic denial of the possibility of spiritual substances and of immaterial powers, such as the human intellect, must also be rejected.

With somewhat less assurance, I am persuaded by everything I know that brain action by itself does not and cannot suffice to explain conceptual thought, because the essential character of such thought involves transcendence of all material conditions. The reach of the human mind to objects of thought that are totally imperceptible and totally unimaginable is the clearest indication of this.

Where does this leave us? As I see it, with these three conclusions: (1) All aspects of animal behavior, animal intelligence, and animal mentality—all below the level of conceptual thought—can be or will be satisfactorily explained by our knowledge of the brain and nervous system. (2) Such knowledge can now contribute—and in the future it will do even more to contribute—to the explanation of the acts of the human mind. But neurophysiology will never provide a completely satisfactory explanation of conceptual thought and freedom of choice. (3) Programmed machines, at their very best, may simulate acts of animal or human intelligence; but, since they are clearly not living, conscious organisms, such simulation is never more than a counterfeit of perceptual or conceptual thought. It is thought that the machine itself does not experience, thought of which the machine is not reflexively aware. It is never the real thing. 

LETTERS TO THE EDITOR

Dear Max,

I thought you may like to know that we are using Adler's works in our senior secondary Philosophy and Ethics courses at St Peter's College this year.

The whole course lasts for three years (six semesters), each semester is about 70 hours of class time. Currently, there are about 475 students in the senior program at St Peter's College.

Course Outline:

Year 11 Philosophy -11 (Adler) & World Religions	(2 semesters)
Year 12 Ethics -12 (Adler) & Spirituality	(2 semesters)
Year 13 Philosophy -13 (Adler) & Theology	(2 semesters)

To my knowledge, St Peter's College is the only school in New Zealand teaching any significant amount of Philosophy.

I am planning to be in Los Angeles between April 13 and 18 this year to give a paper at the Lonergan Symposium at Loyola Marymount University (it will be the 100th Anniversary of Lonergan's birth) The title of my paper is: **The Universality of Language Thesis - Wittgenstein and Lonergan.**

The paper explains Wittgenstein's thesis and then shows how Lonergan's analysis of human understanding, as developed in his work **Insight**, answers Wittgenstein's arguments and improves on his insights.

If you or your CSGI associates are in LA at that time, it would be my great pleasure to meet you or them.

I hope you are well and that the Center is prospering.

Cheers,

David

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Founded in 1990 by Mortimer J. Adler & Max Weismann

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E-mail: TGIdeas@speedsite.com

Homepage: <http://www.thegreatideas.org/>

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