

## On Minds and Mental Models

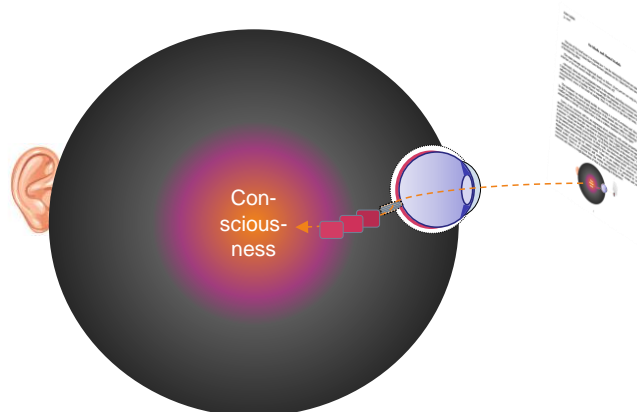
The aim of this brief essay is to explain how I see the relationship between my mind and the external world. I do not claim that I have the best opinions nor do I claim that I have invented any of the following ideas.

The main message can be expressed shortly as follows: *Every person can only be aware of what her or his own mental model offers to the conscious self.*

Obviously, there are several enigmatic terms in the sentence, including consciousness and self. I believe that any reader can understand well enough the meanings of consciousness and self by reflecting the process of reading: There is something (a self) that reads and is somehow (through consciousness) aware of the result of reading. Thus we can move to the third key term, mental model.

The machinery on which mental models are running is a result of evolution and, thus, must be able to support the survival and reproduction of the animal. But wait, there appears to be a conflict between the beginning and the end of the sentence: machinery refers to technology while animal refers to biology. Do I believe that a brain is a lifeless machine or a living organ?

I have, or my conscious self has, an impression about machines with certain properties and another impression about living animals with different properties. These impressions are separate and if I try to combine them into one coherent impression, I feel a slight discomfort. If I think of a sentence “a brain can be either a machine or a living thing, but not both at the same time,” I can sense some mixed but mostly positive feelings. All of these impressions and feelings are created by the mental model running in my brain. In other words, the whole creation process I described in the previous sentence is an impression created by the very same mental model. And so on. My thinking cannot ever escape my mental model. When you are reading these sentences, your mental model processes all sensations and creates an impression to be perceived by your consciousness. There is no shortcut from the written text appearing on the screen and your conscious self. Here is a rough illustration of what is happening in the process:



The convoluted process from the pure sensations to the conscious perception depends on the functioning of numerous modules in the brain without which no useful perception or impression can emerge in the conscious self. A malfunctioning module can create strange effects, for instance, an inability to find words, to perceive movement, or to produce movement. It is impossible to cure any of these inabilities through the hardest conscious effort.

However, most of the time it is better to believe that we are directly aware of the objective reality, that we can be absolutely sure about some facts of reality and that we are able to directly control our bodily movements. In normal life, the idea of mental models is just a nuisance that complicates reasoning and slows down actions. But then there are situations in which it is good to remind your mental model that it is just a mental model.

When? For instance now. Everything presented in this essay is produced solely by the mental model running in the brain of the author. To emphasize this idea I decided not use any reviewer or proof reader that complicates the idea of one mental model. For the same reason, I am not using any direct citation, though of course numerous persons have affected the ideas expressed in this essay.<sup>1</sup>

I am not sure whether there can be any consciousness without some content produced by the attached mental model. In other words, my mental model does not produce any clear opinion about the possibility of consciousness without any content – but that is just an unsuccessful effort made by my mental model, not a proof of anything. You, the reader, may have a stronger opinion about this issue, for or against. Whatsoever your opinion is, it is created by your mental model. Note also that the idea of consciousness is generated by the same mental model. I would (somewhat hesitantly) say that a mental model is self-aware rather than that there is a separate entity called self that is conscious of something created by another entity that can be called brain, mind, or mental model.

A mental model is running on the machinery of brain similarly to software running on a hardware platform. Whether something else in addition to the physical processes of the brain is needed to create a conscious self is an open issue for me. However, it is extremely hard to understand how consciousness can emerge from the physical or biological processes occurring in the brain. Thus, there may be something ethereal that is needed for consciousness to emerge. Spirit, soul, or chi or something similar might be needed to explain consciousness—the problem is that those terms provide only a minimal explanatory value. Anyway, my mental model permits the existence of a non-material spirit. Unfortunately, only a few implications can be drawn from the assumption of a spirit. To say the least, an idea of a world with spirit is more gratifying than an idea of a purely material world.

From the viewpoint of the theory of evolution, consciousness must offer some considerable additional value in the struggles of life, because the metabolic cost of consciousness is significant. What is the value? Maybe consciousness is a mandatory gatekeeper between self and world, or

---

<sup>1</sup> The authors of books I have read and that have affected my thoughts about the functioning of mind include D. Barash, J. Barrat, S. Blackmore, T. Crane, A. Damasio, L. Daston & P. Galison, R. de Sousa, A. Feenberg, M. Gazzaniga, I. Glynn, S. Harris, J. Hawkins, D. Haybron, D. Hofstadter, W. James, J. Krishnamurti, R. Kurzban, R. Kurzweil, D. Lama, B. Libet, H. Maturana & F. Varela, T. Metzinger, M. Minsky, L. Mlodinow, T. Nagel, J. Piaget, J. Prinz, A. Pross, O. Sacks, D. Siegel, R. Swinburne, E. Wilson, L. Wittgenstein, and N. Yanofsky.

between a conscious self and other selves. But gatekeeping is just a metaphor. Could we conceive something more convincing? Some traditions claim that the core of consciousness can be found only by silencing all thoughts. Eternal, universal silence. Maybe so, but whatever is left after thoughts are silenced can hardly explain the evolutionary benefit of consciousness. It is possible to imagine an extremely complex, unconscious mental model that is able to direct the behavior of a body in a delicate way. From the perspective of information processing, it is difficult to understand why consciousness is needed for meaningful behavior.

Thus, intentional actions seem to require a big nervous system consuming a lot of energy. My fragile explanation to this riddle is that consciousness is the most efficient way (found via evolution) to integrate separate perceptions into an integrated whole. The whole is essentially a simulation model running in the brain, called in this essay the mental model. The model not only integrates visual, auditory and other perceptions but also memories, imagined scenarios of future events, and even hallucinations.

Once again, the mental model provides everything of which we can be consciously aware. One corollary of this thought is that the only way to implement free will is to interact with the mental model. The most helpful way is not to enforce some physical actions, but to act as a kind of mentor or instructor for the unconscious part of mind that anyway takes care of great majority of (or perhaps, all) actions. Besides, the mental model (most of which is unconscious) is the only way to answer all the questions we have in our mind. If, as I want to believe, there is a free will, it has to function in the intersection connecting memory, present, and the imagined future. This is when and where consciousness comes on the scene: we can imagine different futures and deem some of them better than some others. Then we can strive for realizing the best scenarios. However, all actions (including imagining, deeming and striving) require services from the mental model. Maybe the only available place for the free will is, after all, in the silence.

We tend to assume that the conscious self is responsible for all actions that go through consciousness. If someone could have done differently, he is responsible for the predictable consequences of a deliberate action. As to unconscious actions, the situation is more complex; it is unclear whether a person is responsible for the consequences of his automatic actions. However, I tend to think that the conscious self is responsible for the development of any automatic behavioral pattern, particularly when the pattern is somehow abnormal and when it has required considerable effort to develop. A mature conscious self has to steer the behavior of the mental model even though the self cannot be aware of the details of processes going on in the brain.

We can draw some consequences from the unique role of mental model. First, no person can ever have any absolute truths outside the realm of his or her own mental mode. Even when you consider an obviously true statement, like, "I exist, because I have this thought," your mental model produces a feeling of absolute certainty, but at the end, even that is a feeling produced by the mental model.

Returning back to evolution, beliefs are more about usefulness than about pure truth, even when a person (or a mental model) is working within a scientific community. To be successful in the social system of a scientific community, the mental model must have a clear idea about the accepted truths in the corresponding field of science. It is highly useful for a person to accept the prevalent truths and ways of thinking of the scientific community. In a way, even the results of

best scientific studies are uncertain, because the results are always located in imperfect mental models. Having said this, I have a strong trust on science. Whenever someone questions widely accepted scientific truths, the person most likely has a selfish reason to do that; typically, the person wants to increase the relative power of his social group over other groups.

So, what is the nature of scientific truths? From the viewpoint of mental models, all useful results of science are constructions in the mental models of human beings. Every scientific concept is a concept in a mental model and does not, thus, strictly refer to anything in external reality. The main task of mental model is to guarantee the survival and reproduction of the body, also in the case of the best scientists.

Science is an effort to build workable and useful models on numerous layers of understanding. On the higher layers, new phenomena seem to emerge from the complex interactions between lower level entities. Liquid water is freezing when the kinetic energy of water molecules falls below a certain threshold, two persons fall in love during a close relationship when their oxytocin levels grow above a limit, or a serious dispute between the leaders of two states brings about a war.

All the concepts, including water, energy, person, love, state, and war are at the end merely concepts. In the case of some concepts, like energy, science has been able to develop a consensus about the exact meaning of the concept. This specific meaning of energy seems to refer to something real outside the mental models. The same concept, energy, is also used in the mental models of ordinary people with much vaguer meaning and role in communication. The situation is even more challenging on all layers above the physically measurable things. With concepts like love and war, there is no hope to reach universal consensus. According to the judgement of my mental model, there is no independent something called love outside the realms of mental models. Still, some mental models can be constructed in a way that the mental model itself includes a concept of an eternal and universal love that is realized in different ways in reality. That way of thinking is understandable, acceptable and perhaps useful in many situations.

The measurable behavior of atoms and the behavioral patterns of human beings represent two extremes. A hard challenge when we analyze the usage of technical artefacts is the combination of measurable things and subjective experiences. With an objective measurement there very seldom is any need to remind us about the role of mental models; in contrast, with subjective assessments, the mental model always has a key role in the analysis. The challenge of combining the spheres of objective and subjective events in one analysis is serious because of the dissimilar ways of thinking.

There are severe challenges also in the ordinary life. There is a tension between three kinds of questions: (1) Is a statement true or false? (2) Is a statement or an event pleasant or unpleasant? (3) Is an action beneficial or harmful? The same mental model gives the answers to all these questions by using the same modules and methods. It requires a considerable mental effort to keep the questions separate. In practice, the middle one (2) is the dominant viewpoint. The additional challenge is that the third question is naturally looked from a personal perspective: (3a) Is an action beneficial or harmful for me or for my group? However, the more relevant and important question often is: (3b) Is an action beneficial or harmful for the society as a whole? Honest science (1) and honest politics (3b) are hard endeavors because they require deliberate building of an appropriate mental model to compensate the natural tendency to concentrate on the middle question 2 (question 3a is often automatically converted to question 2). Business sector concentrates

on seeking solutions to the questions of type 3a. A failure to develop the required mental abilities of assessing question types 1 and 3b can lead to serious problems in the society.

To summarize my remarks about mental models: You shall not take your own opinions too seriously, because they are created by an imperfect mental model that is more interested in usefulness than in truth. More specifically, you can know another person only as an entity in your own mental model. The model can be more or less realistic or useful, but it is always a model. The same remark is also valid with yourself. Finally, every conscious self is equally valuable per se, whereas the actions guided by the mental model can either be highly valuable or harmful for other people. Use your mental model wisely.

I hope that this essay has offered some constructive elements for building a useful mental model.