CS drive

For Computer Science Students

Friday, October 11, 2013

4.2 Gelernter, Penrose, Pinker, Searle res[illegible]s :csdrive

Gelernter Response to Descartes:

David Gelernter uses the term "consciousness" to denote the possession of what philosophers call *qualia*. He's not talking about the differences between the brain states of waking and sleeping animals, and he's not talking about self-consciousness -- an animal's ability to recognize itself in a mirror, or to use the states of its own body (including its brain) as subjects for further cognition. Qualia are the *felt character of experience*. To be conscious, in Gelernter's sense, is to have qualia.

Gelernter divides artificial-intelligence theorists into two camps: cognitivists and anticognitivists. Cognitivists believe that, if human beings have qualia, then a robot that behaves exactly like a human being does, too. Gelernter's initial claims:

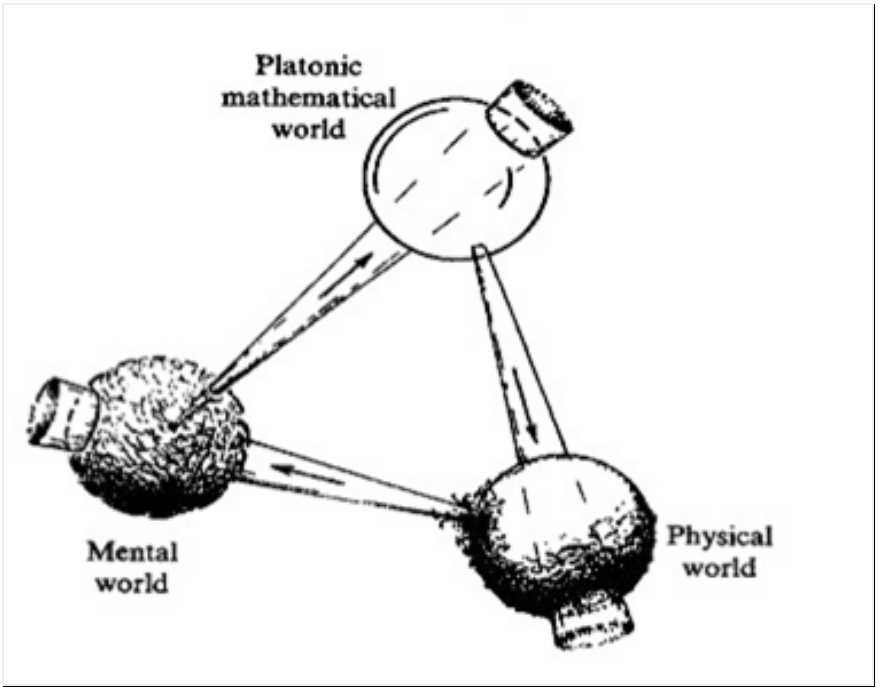
(1) "This subjectivity of mind has an important consequence: *there is no objective way to tell whether some entity is conscious.*"

(2) "we know our fellow humans are conscious."

Human thought, asserts Gelernter, exists along a continuum, spanning from high-focus thinking -- in-depth analytical problem solving -- to low-focus thoughts, consisting of the daydreams and hallucinations that occur when one's mind is wandering. Artificial intelligence research has historically focused on the logical, goal-driven thoughts at the high-end of the spectrum. Gelernter argues that, if the goal truly is to create a computer that can solve problems in a way similar to that of the human mind, then study of unfocused, emotional, low-end thinking must be incorporated into artificial intelligence research, for it is as central to human cognition as logic.

Penrose Response to Descartes:

Roger Penrose has a picture of mind and matter that is not just a relation between logical and physical, but involves three worlds: Platonic, mathematical and physical.
In his more recent *The Road to Reality,* Roger Penrose leaves aside the question of computability in physics, and gets down to the core of physics itself. Once you are past the first thousand pages you can read about his own vision of what it should be like: twistor theory.



Additionally, Roger Penrose has proposed the idea that the human mind does not use a knowably sound calculation procedure to understand and discover mathematical intricacies. This would mean that a normal Turing complete computer would not be able to ascertain certain mathematical truths that human minds can.

Penrose presents the argument that human consciousness is non-algorithmic, and thus is not capable of being modeled by a conventional Turing machine-type of digital computer. Penrose hypothesizes that quantum mechanics plays an essential role in the understanding of human consciousness. The collapse of the quantum wave function is seen as playing an important role in brain function.

Pinker Response to Descartes:

The mind, for Steven Pinker as for almost all other cognitive scientists, is computational. This does *not* mean they think it works just like the computer you're reading this on, but that has representations, which it transforms in a rule-governed, algorithmic way. Moreover, the mind is not a single, general-purpose computer, but a collection of them, of "mental modules" or "mental organs," specialized as to subject matter, each with its own particular learning mechanism ("an instinct to acquire an art," in a phrase Pinker lifts from Darwin). This modularity is evident in studying how children learn, and also from tracing the effects of brain lesions which, if sufficiently localized, impair specific abilities depending on where the brain is hurt, and leave others intact. Just as, baring developmental defects, wounds, or the ravages of disease, all human beings have the same physical organs, we all have the same mental organs, whose general structure is, again, the same from person to person.

By insisting on the complexity of the mind, Pinker claims that;

- thinking is a kind of computation used to work with configurations of symbols,
- the mind is organized into specialized modules or mental organs,
- the basic logic of the modules is contained in our genetic program,
- that natural selection shaped these operations to facilitate replication of genes into the next generation

Pinker thus shows that the computational model of mind is highly significant because it has solved not only philosophical problems, but also started the computer revolution, posed important neuroscience questions, and provided psychology with a very valuable research agenda

Searle Response to Descartes:

Consciousness is a biological phenomenon. We should think of consciousness as part of our ordinary biological history, along with digestion, growth, mitosis and meiosis. However, though consciousness is a biological phenomenon, it has some important features that other biological phenomena do not have. The most important of these is what I (John Searle) have

called its `subjectivity'. There is a sense in which each person's consciousness is private to that person, a sense in which he is related to his pains, tickles, itches, thoughts and feelings in a way that is quite unlike the way that others are related to those pains, tickles, itches, thoughts and feelings. This phenomenon can be described in various ways. It is sometimes described as that feature of consciousness by way of which there is something that it's like or something that it feels like to be in a certain conscious state. If somebody asks me what it feels like to give a lecture in front of a large audience I (Searle) can answer that question. But if somebody asks what it feels like to be a shingle or a stone, there is no answer to that question because shingles and stones are not conscious. The point is also put by saying that conscious states have a certain qualitative character; the states in question are sometimes described as ‘qualia'.

In spite of its etymology, consciousness should not be confused with knowledge, it should not be confused with attention, and it should not be confused with self-consciousness. I (Searle) will consider each of these confusions in turn.

Conscious states are caused by lower level neurobiological processes in the brain and are themselves higher level features of the brain. The key notions here are those of *cause* and *feature*. As far as we know anything about how the world works, variable rates of neuron firings in different neuronal architectures cause all the enormous variety of our conscious life. All the stimuli we receive from the external world are converted by the nervous system into one medium, namely, variable rates of neuron firings at synapses. And equally remarkably, these variable rates of neuron firings cause all of the colour and variety of our conscious life. The smell of the flower, the sound of the symphony, the thoughts of theorems in Euclidian geometry -- all are caused by lower level biological processes in the brain; and as far as we know, the crucial functional elements are neurons and synapses.

The first step in the solution of the mind-body problem is: brain processes *cause* conscious processes. This leaves us with the question, what is the ontology, what is the form of existence, of these conscious processes? More pointedly, does the claim that there is a causal relation between brain and consciousness commit us to a dualism of `physical' things and `mental' things? The answer is a definite no. Brain processes cause consciousness but the consciousness they cause is not some extra substance or entity. It is just a higher level feature of the whole system. The two crucial relationships between consciousness and the brain, then, can be summarized as follows: lower level neuronal processes in the brain cause consciousness and consciousness is simply a higher level feature of the system that is made up of the lower level neuronal elements.

John Searle has offered a thought experiment known as the Chinese Room that demonstrates this problem. Imagine that there is a man in a room with no way of communicating to anyone or anything outside of the room except for a piece of paper that is passed under the door. With the paper, he is to use a series of books provided to decode and “answer” what is on the paper. The symbols are all in Chinese, and all the man knows is where to look in the books, which then tell him what to write in response. It just so happens that this generates a conversation that the Chinese man outside of the room can actually understand, but can our man in the room really be said to understand it? This is essentially what the computational theory of mind presents us with; a model in which the mind simply decodes symbols and outputs more symbols. It is argued that perhaps this is not real learning or thinking at all. However, it can be argued in response to this that it is the man and the paper together that understand Chinese, albeit in a rudimentary way due to the rudimentary nature of the system; as opposed to if the man learned Chinese, which would create a sophisticated system of communicating Chinese.

Labels: descartes, gelernter, ics, penrose, pinker, response to descartes, searle

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4.3 Natural Language Processing :csdrive

4.1 Connectionist Approach :csdrive