

The Mind-Body Problem

Introduction to Cognitive Science

What is the 'Mind'?

- One reason why cognitive science is such a young science, is that its subject matter, the mind, is so ill-defined.
- This is rather strange, as there is almost nothing that we are so intimately familiar with as our mind.
- But the problem is that you would be hard-pressed to say what that mind actually is:
 - Where do you point to when asked to show your mind?
 - What would you place under the microscope or on the dissection table when you are asked to study the mind?

What is the Mind-Body Connection?

- Our body and mind seem to be intimately connected:
 - When I hit your foot with hammer, you will feel pain.
 - When you decide to raise your hand, you do it
- But what exactly is this connection between our body and mind? Why is there such a connection? How does it work?
 - Is the mind part of our body? Is it simply our brain?
 - We know that changes in our brain result in changes to our mind.
 - But does that really make them the same? It certainly seems very strange to say that our mind weighs 3 pounds (like our brain does)!
 - Or is our mind the way our body behaves?
 - We often judge that someone has certain mental abilities (and hence has a mind) by their behavior.
 - But does that make them the same? Most of us think that behavior is a result of our mind, not part of it!

The Problem of Other Minds

- The difficulty in trying to figure out what the mind is, is nicely illustrated by the Problem of Other Minds:
 - You know that you yourself have a mind in that you have direct access to your own mind. You are aware of your thoughts, perceptions, emotions, etc.
 - However, does anyone else have a mind? Do animals have minds? Machines? How can you tell? It seems like you don't (indeed, can't!) have any access to their minds like you have to your own.
 - Indeed, can you be sure they even have minds? This is the Problem of Other Minds.

Judging Other Minds

- Observing cognitive agents other than ourselves seems to only provide *indirect* evidence of a mind
 - For example, suppose that I ask you a question, and I get a (somewhat intelligent) response from you. Now, I may well infer from that that you have a mind. But, notice that the reason I make this inference is because I know that I have a mind, and that, *in using my mind*, I would answer the question in a way similar to your answer. So, I suspect that you went through a similar process that I would go through, i.e. that you are using your mind (and thus you have one). But again, I never got any direct glimpse of your mind. Indeed, maybe you answered the question without using any mind at all (e.g. maybe you were just ‘hardcoded’ or ‘hardwired’ to give that response).

Anthropomorphism

- This is also what makes it so hard for us to attribute minds to things other than human (other animals, machines, etc)
 - If I see something that doesn't behave or respond in ways I (or humans in general) behave, then we can't explain that by attributing an underlying mind like ours, and since I know of no other minds, I may well declare that this entity has no mind at all.
 - Or, based on certain responses I may declare it to have certain mental states that it doesn't have at all
 - In sum, the fact that we can't observe someone or something else's mental states directly, means that we almost by necessity have to anthropomorphize, which most likely leads to misattribution of mental states or mental capacities.
 - Hopefully, a mature cognitive science will correct this!

Descartes' Skepticism

- The French mathematician/philosopher Rene Descartes continued this line of thinking (i.e. of not being sure of what really exists) even further.
- According to Descartes, it is possible that *nothing* that I observe (such as my body, or anything else physical for that matter!) actually exists:
 - I could be dreaming
 - I could be deceived by a perceptual illusion
 - I could be in the Matrix 😊
 - There could be an “Evil Genius”, who is putting thoughts and observations about things into my mind that have no actual counterpart in the real world.

Cogito Ergo Sum

- However, even the Evil Genius cannot deceive me that I have certain thoughts:
 - Yes, I can be wrong about there being a hand in front of me:
 - I think there is a hand
 - ... But there is no hand
 - ... no contradiction there
 - However, I can't be wrong about having thoughts:
 - I think I have thoughts
 - ... But I have no thoughts
 - ... but wait: if I think I have thoughts, I *do* have a thought!
- Cogito Ergo Sum! I think, therefore I exist!
- What is the 'I'?
 - A thinking entity: a mind!

Idealism

- Inspired by Descartes' line of thought, *Idealism* is the view that the mind is in fact all that exists, and that the whole physical world we perceive to be around us is just a construction of our mind.
- In fact, *Solipsists* believe that only their own mind exists!
- Idealism and Solipsism are kinds of *Monism*, which states that there is only one kind of substance in the world. In the case of Idealism and Solipsism, that one substance is something non-physical.

Cartesian (Interactive) Dualism

- Descartes himself did not believe that his mind is the only thing that exists. In fact, he argued that there are physical things (such as his body) besides his mind.
- So, Descartes thought that there must be two distinct kinds of entities in the universe: physical ones, such as our body, and non-physical ones, such as our mind. This view on the world is called *Dualism*.
- Moreover, the clear connection between our body (brain) and mind led Descartes to conclude that while the mind and the body are completely distinct entities, the two do somehow communicate, probably *through* the brain. This elaboration on Dualism is called *Interactive (Cartesian) Dualism*.

Descartes' Argument for Dualism

- I am *certain* that my mind exists
- I am *not certain* that my body exists
 - (or any part thereof, or anything else physical)
- Therefore, my mind is not the same as my body
 - (or any part thereof, or anything else physical)

Problem with Descartes' Argument

- The following argument seems to use the same logic, but is clearly invalid:
 - I am certain that Professor Bram is the instructor for Introduction to Cognitive Science
 - I am not certain that the 2011 winner of Dancing with the RPI Stars is the instructor for Introduction to Cognitive Science
 - Therefore, Professor Bram is not the 2011 winner of Dancing with the RPI Stars

Intuitive Argument for Dualism

- OK, so maybe the mind is just physical ... but it certainly doesn't seem like it is!
- Physical stuff:
 - Takes up space
 - Has mass
 - Is 'manipulable' (it can be touched, kicked, painted, observed, etc)
- Our mind doesn't seem to be like that at all!

Intuitive Appeal of Dualism

- Throughout history many (if not most) people have believed in Dualism, probably based on the Intuitive Argument.
- In fact, even now, many people believe in Dualism, and make a fundamental distinction between mind and body:
 - When asked who or what we are, people will usually respond that we are (or have) a mind as well as a body
 - Many people also believe that the mind can survive the death of the body
 - Indeed, many people see the mind as some kind of ‘soul’ or ‘spirit’ that inhabits and controls the body (the ‘ghost in the machine’, or the ‘captain of the ship’).

The Free Will Argument for Dualism

- This last idea translates into a common argument for dualism:
 - If we are just purely physical objects, subject to the laws of physics, then everything we do is already determined by these laws.
 - But, we can make decisions, we can make choices: we have free will!
 - Therefore, we are not purely physical objects

Classical Dualism

- Moreover, many people see a kind of ‘priority’ to the mind. Again, the mind is what controls the body, and the mind is what is ‘running the show’.
 - Indeed, the mind is often thought to be able to survive the death of the body, but not vice versa
- Consequently, *Classical Dualism* sees the connection between mind and body more of a one-way street: the mind tells the body what to do, not vice versa
 - This view follows the thousands of years old ‘animistic’ views on the universe
 - (the fact that I feel pain when my body gets hit is merely because I choose to feel pain; I could choose not to feel pain, and many people claim to have that kind of power of ‘mind over body’).

Materialism

- In more modern times, and influenced by the worldview that modern science provides us with, more and more people believe that the mind is simply part of the physical universe.
- This view is called Materialism (or Physicalism), and is another kind of Monism, but quite different from Idealism.
 - Monism: there is only one kind of ‘stuff’
 - Idealism: there is only ‘mental stuff’
 - Physical ‘stuff’ is either an illusion (there is no external physical world the way we think there is), or an abstract description of my mental experiences
 - Materialism: there is only ‘physical stuff’
 - Mental ‘stuff’ is either an illusion, or the product of physical stuff (e.g. an abstraction, or combination, of physical stuff)

Materialism vs Dualism: Science vs Religion?

- Materialists and Dualists have been fighting hard.
- During this fight, I often hear students make the following argument:
 - “Dualism is old and pre-scientific. In fact, most dualists are religious people who still believe in souls and spirits. Materialism is new and scientific, and is free from any religious thinking. Therefore, dualism is false and materialism is true.”
- Please don't do this!! You're making cheap ad hominem and circumstantial reasoning. Do not frame this debate as a “religion vs science” fight!

Some Arguments for Materialism

- The Neural Dependency Argument
- The Science-Has-Shown-Everything-Else-To-Be-Physical Argument
 - Ockham's Razor Argument
 - Physical Closure Argument
 - Conservation of Energy Argument
- The Biological History Argument
 - Earth's History
 - Personal History

The Neural Dependency Argument

- The existence of our mind, and its nature, seems to be a direct function of the nature of our brain.
 - Physical changes (damage, direct stimulation) to the brain result in changes in the mind
 - Chemical changes (e.g. drugs) have effect on our mental states
- The best explanation of this fact is that our mind is simply a product of the brain; the logical result of what the brain is doing.

Minds without Brains?

- What about Out-of-Body Experiences?
 - Materialists say that Out-of-body experiences are just that: *experiences*, produced by the brain, that can be explained by science without having to postulate any kind of soul or spirit that somehow leaves the body
 - In fact, if the mind and body really are distinct, wouldn't such experiences be commonplace? Why would the mind leave the body only under physically traumatic circumstances?
- We have never found any clear evidence of the possibility of there being a mind without a brain.

Dualist Defense to the Neural Dependency Argument

- Dualists often reply that the neural dependency argument is not absolute proof though.
- If the mind and brain are fundamentally distinct entities, but there is nevertheless a tight connection (of communication) between them, then that would also explain why changes to the brain would result in changes to the mind: you are simply changing the input to the mind, so of course the mind will react differently!

Materialist Reply to the Dualist Defense

- On that story, wouldn't changes to the brain merely effect the sensory input to the mind? So why couldn't the mind still have independent thoughts? That never seems to happen in such cases. In fact, with serious brain damage, whole parts of the mind seem to be completely gone! Why? If the mind is separate from the brain, shouldn't the mind still be intact?
- Also, 'absolute proof' is never to be found in science. Science always works by inference to the best explanation, and the best explanation seems to be that the mind has a purely physical, neural, basis.

The “Everything Else Is Physical” Argument

- Science seems to show that everything in the universe is physical, or at least is some kind of abstraction of what are ultimately physical processes:
 - Chemistry seems to reduce to physics: chemical reactions and properties can be explained by reference to underlying physical processes.
 - Biological processes seem to be purely physical (or chemical, and thus ultimately still physical) processes as well.
 - For a while we thought that living entities would have some kind of ‘entelechy’ or ‘vital spirit’ inside them, as we couldn’t explain the difference between alive and dead beings. But, as technology and science progressed, we actually can observe the differences that would explain why certain things are alive and others are dead.
 - Similarly, psychology, and all of cognition will ultimately be shown to reduce to merely physical processes in the end: the idea of the mind as a non-physical ‘soul’ or ‘spirit’ will go the way of the ‘entelechy’: a fantasy that has had its time.

Ockham's Razor Argument

- An argument very much related to the 'everything-else-has-turned-out-to-be-physical' argument is the Ockham's Razor Argument
- Ockham's Razor states that when two theories explain some phenomenon equally well, then the simpler theory is preferred
 - Why is this?
 - Sometimes this is simply a matter of simplicity itself: simpler theories are easier to work with
 - Also, simpler theories tend to be more general as well, which means that it can be used and applied to more cases
 - But sometimes, the simpler theory is actually more likely to be true: sometimes, theories are complex because they have incorporated certain idiosyncrasies from our data or observations that don't generalize to all cases under the intended scope of the theories.
- Since Materialism offers a much 'simpler' worldview ("Everything is physical. Period.") than Dualism, this argument goes, Materialism is the preferred theory.

Problem with the use of Ockham's Razor in this Context

- The problem with this argument is that neither Dualism nor Materialism *explains* the mind
 - Dualism states that the mind is 'non-physical'. OK, so it is *not* physical. But then what *is* it? Dualism doesn't say!
 - Materialism states that the mind is physical. OK, but how so? What is the physical explanation for the mind? How do physical processes come together to form a mind? Materialism has (*as of yet!*), no answer to this question, so it really doesn't explain anything either!
 - Ockham's Razor is really not applicable in this case!

The Physical Closure Argument

- Science seems to show that the universe is ‘physically causally closed’, meaning that every physical event is caused by other physical events alone.
- The reason for this claim is simple: Science has been very successful in explaining every physical event in terms of other physical events alone, and hence there is no need to appeal to, or even postulate the existence of, non-physical events. Thus, the argument goes, there is no need to postulate a non-physical mind either.
- Unfortunately, this argument has one immediate problem, which is that just because we can explain *physical* events by physical events alone, doesn’t mean that we can explain everything (including the mind) by physical events alone, unless we already assume that everything (including the mind) is physical.

The Conservation of Energy Argument

- A well known expression of the 'physical closure' claim is the Law of Conservation of Energy, which can be used in the following argument: If the mind is non-physical, interacts with the physical body, then energy would not be conserved (e.g. me 'willing' to raise my hand would introduce energy). But, since energy does get conserved, the mind must not be non-physical, i.e. it is physical.

Problem with the Law of Conservation Argument

- Unfortunately, also this argument has problems:
 - First, the dualist can point out that this law has only been confirmed in situations involving entities that don't involve any kind of mind.
 - Second, the Law of Conservation of Energy seems to merely be an expression of the Uniformity of Nature:
 - Suppose we ran some kind of experiment, and measured all of the known forms of energy 'before' and 'after', and found some difference. Would we now reject the Law of Conservation of Energy? No, as long as this difference is systematic (i.e. *as long as nature behaves in a uniform fashion!*), we would define a new form of energy relative to what happens in the experiment and which, we would postulate, accounts for exactly this difference.
 - In other words, given that we define energy in terms of action potentials, it is no wonder that we find that energy gets conserved!
 - But, does the uniformity of nature imply that all of nature is physical? No. As long as non-physical entities behave in uniform ways themselves, and interact with physical entities in uniform ways, we will continue finding that 'energy gets conserved'. But this shows nothing about the fundamental nature of the universe!

Epiphenomenalism

- Still, the Conservation of Energy principle has some Dualists worried, leading to another form of Dualism: Epiphenomenalism
- Epiphenomenalists state that the mind is the result of (i.e. caused by) physical processes, but that it is causally inert itself. Thus, our conscious thoughts, experiences, and feelings are like the ‘sparks’ produced by a running ‘machine’ (the brain): they are produced by the machine, but have no effect on the functioning of the machine.

Non-Interactionist Dualism

- The idea that the mind does not interact with the body actually precedes Epiphenomenalism.
- This is because conceptually, how could something non-physical even interact with something physical in the first place?!?
 - We can intuitively conceive of how two physical entities would interact: they both occupy some part of space, and since no two physical objects can occupy the same part of space, these entities can collide when moving through space, and thus interact (the ‘billiard ball’ conception)
 - But, Dualists see the mind as something non-physical; something that does not have an extension in space; a ghost-like, ethereal ‘substance’. Well, how can that ‘collide’ with something physical? (see the movie ‘Ghost’ for a nice depiction of this kind of thinking. Also: what was Descartes’ answer?)
- Thus, some Dualists not only proposed that the mind and body are completely distinct, but that they don’t even interact!

Parallelism

- The German mathematician/philosopher Gottfried Wilhelm Leibniz explained the tight connection between the mind and body as an illusion, brought about by the 'running in parallel' of events on the physical side of the universe and events on the non-physical side of the universe.

Positions on the Mind-Body Problem

