

Arguments for Physicalism

Everything is physical



What is physicalism?

“everything is physically constituted” (Montero, p. 1)

- Imagine God creating the world, and in particular imagine that God’s first task is to put all the physical material in place. Now we can ask: Given that God has arranged all the quarks, leptons, and so on, is it time to rest? Antiphysicalists will say “no,” but physicalists will answer “yes.” The antiphysicalists will feel that God still needs to add all the conscious thoughts and feelings. But physicalists will think that this has already been taken care of. By fixing the basic physical facts, God has therewith fixed all the facts, including conscious mental facts. (Montero, p. 2)

Russellian monism?

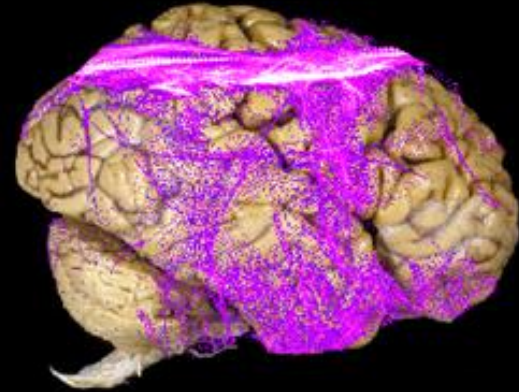
- N.B. This way of explaining physicalism helps to distinguish it from substance dualism and property dualism.
- But Russellian monism says that the maximal physical description of a system is like the tip of an iceberg: *it's just the part that we can describe abstractly.*



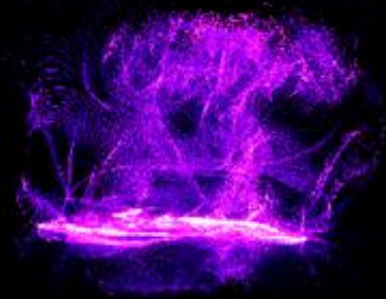
Could God create a world with just iceberg tips, and no icebergs underneath?



materialism



property dualism



Cartesian substance dualism

Supervenience

- To give the basic idea of this “fixing” relation (technically: “supervenience”) we can use Laplace’s demon.
- According to physicalism, if Laplace’s demon knows all the *physical* facts about a person’s brain (facts about quarks, leptons and so on) then the demon can infer all other facts (e.g. about the brain’s conscious thoughts) from them.
 - “... we shall count some property or entity as “physical” not only when it is a basic physical property or entity, but also when it supervenes on the basic physical facts.”

Causal Closure Argument

“the driving motivation behind the commitment to physicalism is the need to explain how things that are apparently not physical can have physical effects.”
(p. 3)

- But why can't *non*-physical things (spirits, souls, angels, etc.) act on the physical world?
- The argument against this is *a posteriori* (i.e. after experience, or empirical).

Causal Closure Argument

1. Science shows us that physical effects can always be accounted for by fully physical causes.
2. Mental facts are often among the causes of physical effects (e.g. I decide to move that stone and thereby move it).

∴ Mental (and biological) causes are physical.

Simple Causal Closure Argument

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2. Mental facts are often among the causes of physical effects (e.g. I decide to move that stone and thereby move it).

∴ Mental (and biological) causes are physical.

- The first premise here is *empirical*, not conceptual.
“Science shows us ...”.
- Other people have offered *conceptual* arguments against substance dualism.
- E.g. Paul Churchland:



If “mind-stuff” is so utterly different from “matter-stuff” in its nature—different to the point that it has no mass whatever, no shape whatever, and no position anywhere in space—then how is it possible for my mind to have any causal influence on my body at all?

“Some of the earliest commentators on Descartes argued that he had divided mind and body too sharply to allow any causal interaction between them. **It is not clear how telling this worry is.** On many conceptions of causation there is no reason why there should not be causal intercourse between Descartes’ two realms, and historically, as we shall see, **it seems unlikely that this traditional concern did much to discredit Cartesian interactionist dualism.**”
(Montero, pp. 4-5)

- (Commentators such as Princess Elizabeth of Bohemia, Pierre Gassendi, Lady Anne Conway.)

Simple Causal Closure Argument

- Montero argues for this premise:

“Science shows us that physical effects can always be accounted for by fully physical causes”

by summarizing the history of science since Descartes.

History of science

1. The “mechanical philosophy” of the 17th century.
(Descartes, Gassendi, Boyle)
 - *All action is due to the impact between one material particle and another.*
 - Hence, anything *other than* a material particle (e.g. a spirit) *cannot* influence the physical world.
 - (But couldn't we just add that spirits can also influence matter?)

2. Newtonian mechanics

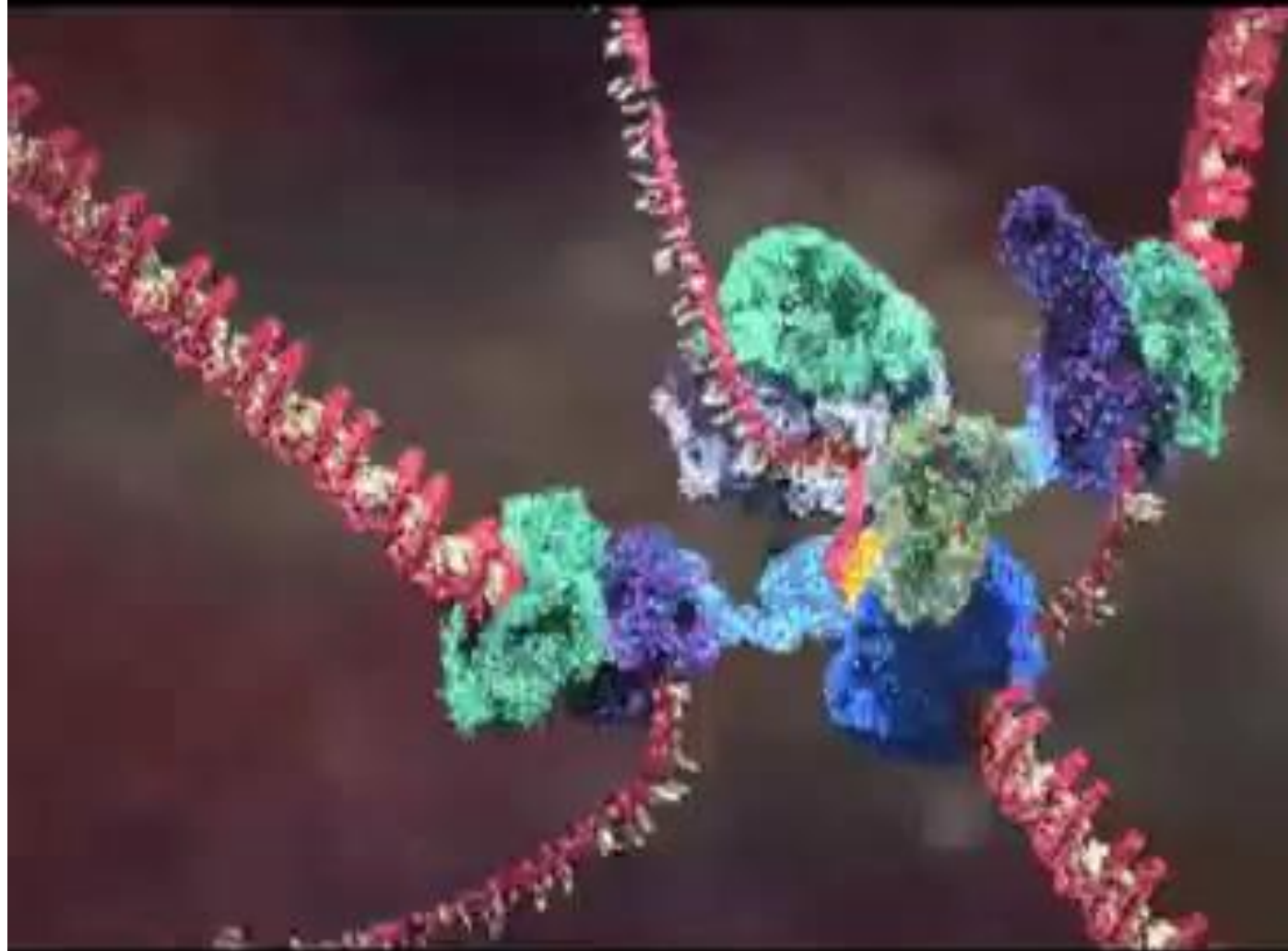
- Newton's force of gravity was *not* explicable in terms of particle collisions, so this led to greater openness about causation.
- “Early Newtonians posited distinctive mental and vital forces alongside magnetic, chemical, gravitational, and impact forces.” (Montero, p. 6)

3. Mid 19th Century

- There are many types of force in physics (gravity, electric, magnetic).
- They are all 'conservative', in the sense that the total work done in moving a particle is independent of the path taken.
- Extra, non-physical forces (e.g. vital, or mental forces) can be added, as long as they are also conservative. (So they must be governed by deterministic laws.)
- E.g. 'nervous energy'

4. After 1950

“By the 1950s, it had become difficult to continue to uphold the existence of special vital or mental forces: detailed physiological research, especially into nerve cells, gave no indication of any physical effects that cannot be explained in terms of the basic physical forces that also occur outside living bodies. A great deal became known about biochemical and neurophysiological processes, especially at the level of the cell, and none of it gave any evidence for the existence of special forces not found elsewhere in nature.” (pp. 8-9)





“The energy stored in the proton gradient is converted into mechanical rotational energy”

“There is no principled a priori reason why 20th-century physiological research should not have uncovered special mental and vital forces. It is just that the inductive evidence went the other way. (p. 9)

- How would 20th century biology have gone, had vitalism or dualism been true? (Or Russellian monism?)

Montero vs. Bonjour

“Of course, it is possible to resist the conclusion. You could continue to believe that there are special vital mental forces that operate in as yet undetected ways in the interstices of living tissues and intelligent brains, and resist physicalism on those grounds. But there seems little merit in this position.”
(Montero, p. 9)

“But why is the principle of causal closure itself supposed to be so obviously correct? Clearly this ‘principle’ is not and could not be an empirical result: no empirical investigation that is at all feasible (practically or morally) could ever establish that human bodies, the most likely locus of such external influence, are in fact never affected, even in small and subtle ways, by nonmaterial causes.” (Bonjour, p. 5)

Full Causal Closure Argument

1. Mental states have physical effects.
2. All physical effects have 100% physical causes.
3. The physical effects of conscious causes aren't systematically overdetermined by two or more distinct causes.

∴ Mental states are 100% physical.

“... a nonphysical mind would be like a ghost in a machine that has the power to flip switches and thereby cause our physical bodies to move. However, we have good reason to believe that all of these machine switches are flipped on or off by other physical parts of the machine. And since it is absurd to think that the switches are doubly flipped by both the machine and the ghost, we should conclude that there is no ghost in the machine, that the mental causes of our bodily movements are themselves physical parts of the machine.”

(Montero, p. 13)

Deny premise 1?

- This takes us to epiphenomenalism:

“despite first appearances, conscious mental states like pains, feelings, and decisions do not in fact cause bodily movements or any other effects in the physical world.”

(Or alternatively to pre-established harmony, as Leibniz thought.)

Accept systematic overdetermination?

“...the physical effects of conscious mental causes [are] systematically caused twice over, both by a brain process and by an independently efficacious mental state.”

Part 2

Physical objections to physicalism

Objections to Physicalism

1. Hempel's Dilemma (physicalism isn't well defined).
2. Quantum physics disproves physicalism
3. Jackson's knowledge argument
4. The introspection argument
5. The explanatory gap

Hempel's dilemma

- We defined physicalism as, “everything is physically constituted” (Montero, p. 1)
 - But then we have to define “physical”.
- Presumably ‘physical’ is defined as something like, “describable using the methods of physics”. But that leads to a dilemma: What do we mean by *physics*?
 - If we use *present* physics, then physicalism is false, since not everything can be adequately described using present physics.
 - If we use *future* physics, then ‘physical’ is undefined. We don’t know what future physics looks like.

Hempel's dilemma

- Montero responds that there are *several* interesting and useful definitions of 'physical'. E.g.
 - falling under deterministic mathematically formulable laws
 - determined by microscopic components
 - similar to the kind of entities recognized by current physics.
 - Composed of the kinds of entity found in inanimate realms
 - (Can be represented precisely in abstract terms?)

Hempel's dilemma

- Montero responds that there are *several* interesting and useful definitions of 'physical'. E.g.
 - falling under deterministic mathematically formulable laws (but determinism is false, so physicalism is false)
 - determined by microscopic components (e.g. microscopic spirits?)
 - similar to the kind of entities recognized by current physics. (Vague. Similar in what respect?)
 - Composed of the kinds of entity found in inanimate realms (Maybe these entities are also spirits?)
 - (Can be represented precisely in abstract terms?) Aha!

Quantum mechanics?

- Some people think that quantum mechanics has negative implications for physicalism.

“It might occur to some readers that, if we are focusing on 20th- century science, then the indeterminism of modern quantum mechanics surely counts against the causal closure of the physical realm, and therewith undermines the causal argument for physicalism. **Doesn’t quantum mechanics show us that plenty of physical effects are chancy, and so don’t have full physical causes?** And doesn’t this then leave room for an independent nonphysical mind to come in and affect what happens in the physical world?” (p. 16)

Quantum mechanics?

This objection, however, is readily addressed. Even if quantum mechanics implies that some physical effects are themselves undetermined, it provides no reason to doubt a quantum version of the causal closure thesis, to the effect that **the *chances* of those effects are fully fixed by prior physical circumstances**. And this alone is enough to rule out any role for nonphysical causes. **Such nonphysical causes, if they are to be genuinely efficacious, must make an independent difference to the chances of physical effects ...**

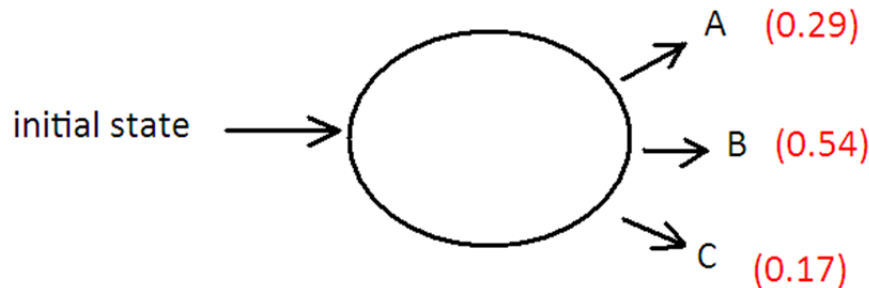
(Thoughts?)

Russellian monism?

- Montero's response to QM apparently argues against something *outside* the brain influencing cerebral processes. Such influence would have to alter the quantum probabilities (something we have no evidence of).
- The response doesn't seem to address Russellian monism, which says that the brain is *itself* non-physical. (In fact, certain features of QM are pretty close to what a Russellian monist would expect, as I'll argue here.)

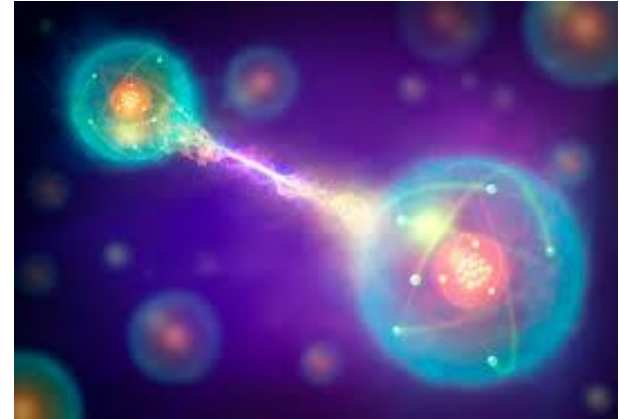
Chancy events are ‘hollow’?

- The indeterministic nature of QM might challenge physicalism in another way that Montero hasn't anticipated.
- Recall my argument that chancy events must be “conceptually opaque” rather than hollow.
 - (This challenges the ‘complete abstract representation’ version of physicalism.)



Quantum entanglement refutes physicalism?

Probably the strangest (most unexpected) feature of quantum mechanics is QM 'correlation' or 'entanglement'.



- In 'classical' physics (physics prior to QM) each separate system (atom, electron, etc.) has its own mathematical object that represents its state at a given time.
- When two QM systems A and B interact, they become 'entangled', which means that they share a single wavefunction for the joint system A+B.

Quantum entanglement refutes physicalism?

- This shared wavefunction means that **measuring system A changes the probabilities for measurements on system B.**
- But the way this happens (the QM “statistics”) does not allow any information to be transmitted from one system to the other.
 - So there is probably no causal connection between them.
- Also, these “statistics” are inconsistent with each system having a more precise state (missing from QM) that determines its own probabilities.
 - The QM statistics are inconsistent with “local hidden variables” theories.

Quantum entanglement refutes physicalism?

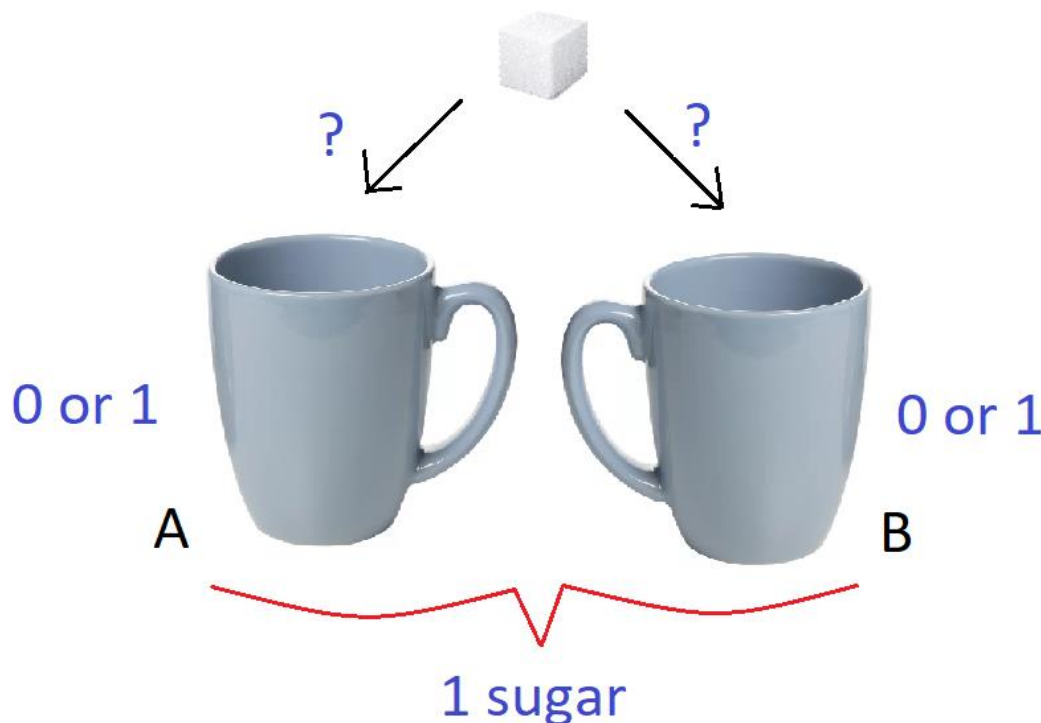
- There are many approaches to explaining QM entanglement. The one I prefer however is based on the idea that there is no *complete* abstract representation of a concrete system.
 - A quantum wavefunction however represents *maximal* information about the system.

“We argue that the distinction between classical and quantum probabilities lies not in their definition, but in the nature of the information they encode. In the classical world, maximal information about a physical system is complete in the sense of providing definite answers for all possible questions that can be asked of the system. In the quantum world, maximal information is not complete and cannot be completed.”

Caves, C.M., Fuchs, C.A., Schack, R.: Quantum probabilities as Bayesian probabilities. Phys. Rev. A **65**, 022305 (2002)

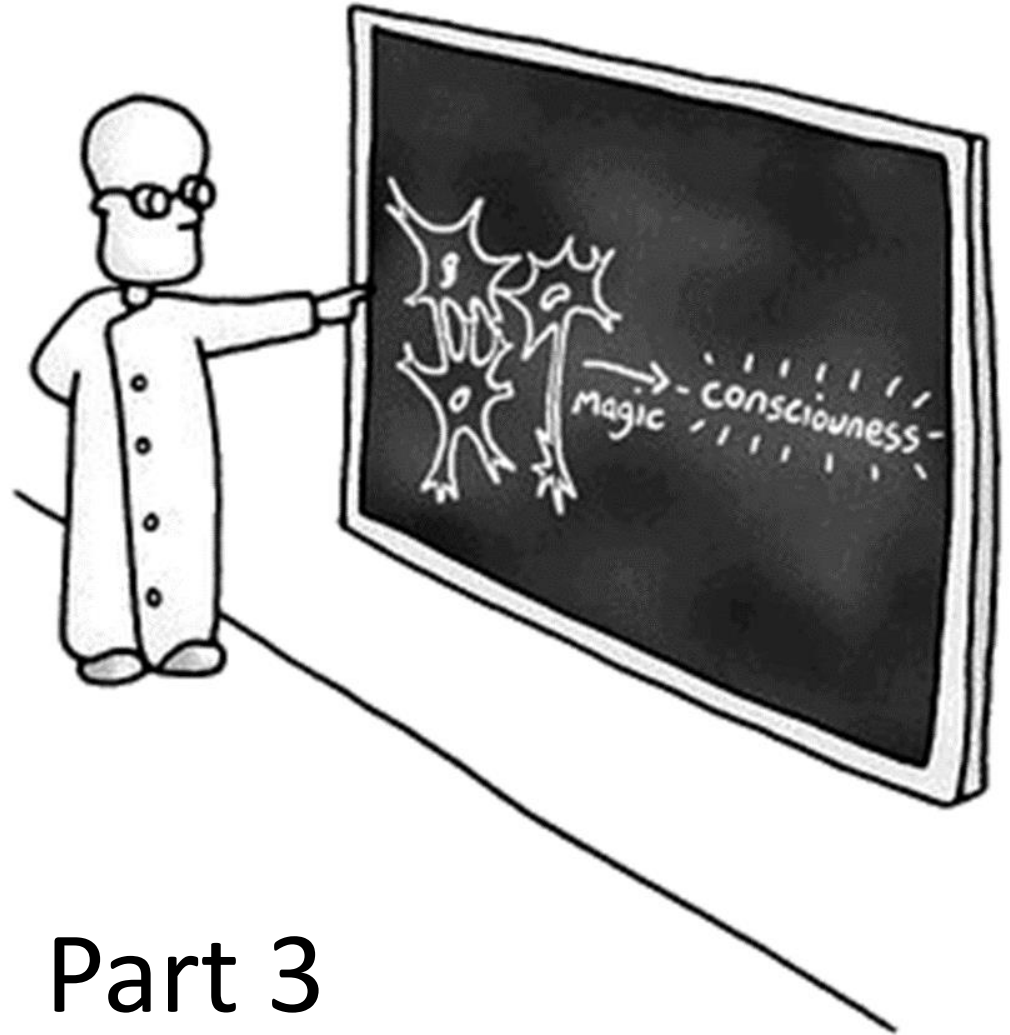
Non-local *information*

An incomplete description of a pair of systems will often fail to 'factorise' into separate descriptions.



$$\text{Info}(A+B) > \text{Info}(A) + \text{Info}(B)$$

Measuring the sugar content of one mug alters the probability of sugar in the other mug.



Part 3

Philosophical objections to physicalism

Van Inwagen: Leibniz's Mill doesn't favour dualism over physicalism.

“Furthermore, we must admit that perception, and whatever depends on it, cannot be explained on mechanical principles, i.e. by shapes and movements. If we pretend that there is a machine whose structure makes it think, sense and have perception, then we can conceive it enlarged, but keeping to the same proportions, so that we might go inside it as into a mill. Suppose that we do: then if we inspect the interior we shall find there nothing but parts which push one another, and never anything which could explain a perception. Thus, perception must be sought in simple substance, not in what is composite or in machines.”

Initial physicalist response

“Suppose a computer has been programmed to compute the orbit of a certain satellite. Suppose the computer were greatly enlarged and that you went inside it, “as into a mill.” **You would not see any orbital computations going on**—or at least you would not see anything that “looked like” orbital computations. (What would you expect orbital computations to look like?)

The Leibnizian thought-experiment, therefore, should cause the physicalist no unease. Things inside the brain look just the way they would look if physicalism were correct.”

Van Inwagen says it's not enough

- “Many physicalists would think that this was a sufficient reply to the charge that the notion of a physical thing that thinks is mysterious. **I cannot agree with them.**”
- Van Inwagen's intuition is right, though he doesn't give a clear argument.
 - Here's the argument: If you looked inside the computer, you **would** be able to see orbital calculations, if you knew how computers work— e.g. how they do floating-point arithmetic, etc.

How *any* sort of thing could think is a mystery.

- Van Inwagen accepts that it's a mystery how a physical system could be conscious.
- His reply to this is: **The notion of a non-physical thing that thinks is equally mysterious.**
- So there is no reason here to prefer dualism over physicalism.

We need a mental representation

“In general, to attempt to explain how an underlying reality generates some phenomenon is to **construct a representation** of the working of that underlying reality, a representation that in some sense “shows how” the underlying reality generates the phenomenon.

“... we are unable to form any sort of representation that displays the generation of thought and sensation by the workings of an underlying reality. Thought and sensation are therefore a mystery.”

We need a mental representation

- “But since the mystery, soluble or insoluble, is entirely independent of whether the elements in the representation are supposed to represent physical or non-physical things, the mystery of thought and sensation does not favor dualism over physicalism.”
- Thoughts?
- If we use my definition of a physical system, as one that can be represented precisely in abstract terms, then van Inwagen’s claim that “we are unable to form any sort of representation that displays the generation of thought and sensation by the workings of an underlying reality” is actually a denial of physicalism!

Nagel/Jackson 'knowledge argument'



Mary's black-and-white neuroscience lab
(Jackson 1982)

Nagel/Jackson ‘knowledge argument’



A



B

- Then Mary is shown the two colour cards above, and is told that *one is red and the other green*.
- Mary knows all about red and green colour experiences, from a physical perspective. But can she say *which sample is red, and which is green*?

The knowledge argument

1. Physicalism is the view that “all information is physical information”.
 - (It is possible to describe all mental processes, *completely*, in purely physical terms.)
2. Mary has complete *physical* information about the neuroscience of human colour perception.
3. But Mary doesn't know (e.g.) red *looks like*, so she doesn't know which card is red.

∴ Some information cannot be expressed in physical terms. (So physicalism is false.)

- The key intuition of the Mary argument (used in premise 3) is very similar to Leibniz's Mill.
- *We are unable to see how any kind of physical description of the brain can tell about the brain's conscious experiences.*

Levine: an explanatory gap?

“When we are told that common salt is NaCl, or lighting is atmospheric electrical discharge, we happily accept these claims as telling us about the underlying physical nature of these everyday phenomena. But when we are told that ... visual experiences of red are neuronal oscillations in the V4 area of the visual cortex, we react quite differently. ... mind-brain identities seem to leave us with an explanatory gap, in a way that other scientific identities do not”

(Joseph Levine, “Materialism and Qualia: The Explanatory Gap”, *Pacific Philosophical Quarterly*, 1983).

Response to the knowledge argument

“Nearly all contemporary physicalists allow that someone who has never undergone a certain kind of experience is cognitively limited as a result, and that a color experience-deprived vision scientist would learn something new when she saw color for the first time. But they do not concede that this change involves her **coming to know about something nonphysical.**”

Montero, p. 12

Is there a *derivability* gap?

“This mainstream view attributes the feeling of an explanatory gap to the impossibility of deriving mind-brain identities a priori from the physical facts. This is supposed to mark a contrast with the scientific cases. While we can often derive scientific identities a priori from the physical facts, so the thought goes, we can’t so derive mind-brain identities, and this creates a feeling of puzzlement about them.”

(Papineau, “The Problem of Consciousness”)

- (In general, explanation requires an *inference* of the effect from the cause.)

Intellectual satisfaction

Fred: See, I'm mixing the baking soda and the vinegar, and it starts foaming rapidly.

Sally: Yes, but why is foam produced?

Fred: I just told you. The foam is caused by mixing baking soda with vinegar.

Sally: Right. But why does mixing soda with vinegar cause foam?

Fred: Oh. $\text{NaHCO}_3 + \text{CH}_3\text{CO}_2\text{H} \rightarrow \text{CH}_3\text{CO}_2\text{Na} + \text{H}_2\text{O} + \text{CO}_2(\text{g})$.

(An intellectual understanding of the cause, as (e.g.) the chemical formulas, allows a person to “see why” that cause must lead to that effect. Is that what Leibniz meant?)

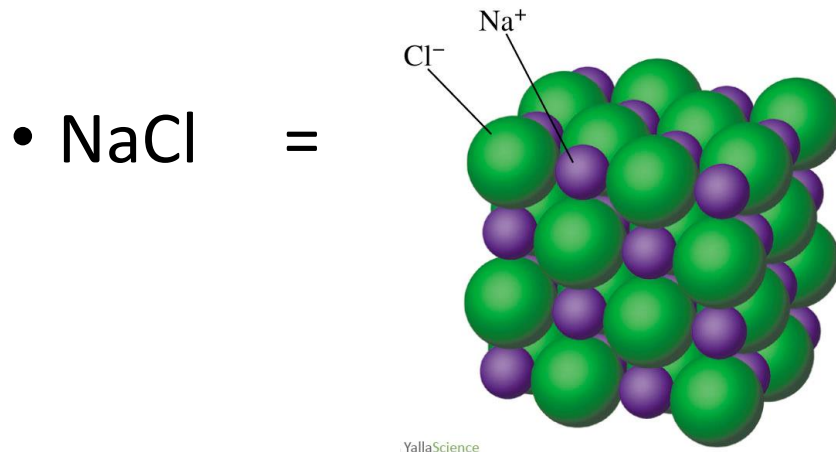
“it is possible for someone who understands things well enough to give a sufficient reason why it the case that P rather than not-P.”

Intellectual satisfaction

- Explanation should be intellectually satisfying. This means that we can “see”, in our minds, *why* the cause *must* give rise to the effect.
- This requires that the propositions describing the causal chain, connecting the cause to the effect, are *logically* related as well.
- I.e. Cause $\Rightarrow E_1 \Rightarrow E_2 \Rightarrow \dots \Rightarrow$ Effect

E.g.

- “salt” = the stuff that is white, crystalline, soluble in water, density 2.16 g/cm^3 , melts at 801°C , ...



- In theory, one can *infer* from this physical model that NaCl is white, crystalline, soluble in water, density 2.16 g/cm^3 , melts at 801°C , ...

A posteriori physicalism

- Papineau (like a majority of physicalists today) endorses *a posteriori* physicalism.
 - (This is an alternative to the traditional *a priori* physicalism)
 - It seems to save physicalism from the knowledge argument.
- Let's go back to the idea that the mental supervenes on the physical. If mental state M supervenes on a physical fact P, we have:
- $\Box(P \rightarrow M)$, i.e. “necessarily, if P then M”
- But what *type* of necessity is this?

A posteriori physicalism

- Up to now, I've assumed the traditional view that this is *logical necessity*, i.e. Laplace's demon (a perfectly rational thinker) can infer M from P. This is sometimes called 'a priori necessity'.
- Instead, perhaps it is 'a posteriori' (or metaphysical) necessity?
 - This is a kind of necessity discovered by Saul Kripke.

A posteriori necessity

- Hesperus, the evening star, is identical to Phosphorus (the morning star). (N.B. They're both the planet *Venus*.)
- This equation, *Hesperus = Phosphorus*, was an empirical discovery. **One could not have learned it from thinking alone.** It is thus *a posteriori*.
- The equation is also necessary in some objective sense. It's false that *Hesperus might not have been Phosphorus*, except in the subjective ("for all I knew") sense, in which a person can even say that 91 "might be a prime number".
- A world where Hesperus \neq Phosphorus would be a world where Venus isn't identical to itself, i.e. an impossible world. So the equation is a posteriori and necessary.

A 'rigid designator'

- Note that Kripke regarded the names 'Hesperus' and 'Phosphorus' as *rigid designators*, so that they each refer to the same object in all possible worlds.
- The connection between name and reference is established by causal connection, not description.
- (If it's established by description, then it could refer to different objects in different worlds, e.g. "the BC Premier in 2018" refers to John Horgan in the actual world, but Christy Clark in some worlds.)

water = H₂O

- Another standard example of an a posteriori necessity is: *water* = H₂O. Again, this was an empirical discovery, and yet it seems false, objectively speaking, that water might not have been H₂O.
- Of course there might have been little or no H₂O on earth, and (perhaps) there might have been things on earth that looked like lakes and rivers that were made of something other than H₂O, and there might even have been beings on earth that called these liquid features 'lakes' and 'rivers'. But those features would still not have been made of *water*.

A posteriori physicalism

- Now let's get back to physicalism.
- The knowledge argument uses a premise that Mary (i.e. Laplace's demon) should be able to infer what red looks like, from a physical description of a red colour experience.
- But if the supervenience relation $\Box(P \rightarrow M)$ uses *metaphysical (a posteriori)* necessity, then Mary cannot make the inference. (Just as we cannot infer *a priori* that water = H₂O.)

What *is* a posteriori necessity?

- On Leibniz's view of possible worlds as God's ideas, i.e. abstract "blueprints" of worlds that God is thinking of creating, these Kripkean a posteriori necessities are indeed true in all possible worlds.
- From our human perspective, having sensory access to only the superficial qualities of water, we can imagine various chemical compositions.
 - But, for God, water and H_2O are *synonymous concepts* and one cannot be thought of apart from the other. The same is true of Hesperus and Phosphorus.

Saul Kripke in 2017



A posteriori physicalism?

- In other words, ***a posteriori* necessity seems to arise only in cases of partial knowledge.** (For an omniscient being, they coincide.) We cannot infer that water contains hydrogen atoms, for example, if we only know the superficial qualities of water.
- Physicalism, however, says that every property supervenes on physical properties, which only makes sense (to me) if the physical description is complete (or “omniscient”).
 - But in such a case, a posteriori necessity cannot exist.
 - David Chalmers says something similar

“[a posteriori physicalism] is by far the most common strategy of materialists who are persuaded that there is no entailment between physical and phenomenal concepts. **On this view, there can be a conceptual gap without a metaphysical gap.** The view offers the enticing prospect of taking consciousness seriously while nevertheless holding on to materialism. Unfortunately, upon close examination the view can be seen quite straightforwardly to fail. ...”

Chalmers, *The Conscious Mind*, Chapter 4