

*Below we give some examples of successful answers and examples of common mistakes in Short Assignment 1. We also give detailed explanations of the material that the questions cover. These detailed explanations are much longer and more in-depth than were needed or expected to achieve full credit. Successful examples are highlighted green and common mistakes are highlighted red. The assignment questions are bold.*

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**Q1: Cain discusses three different reasons for being skeptical about the possibility of a science of the mind or cognitive science. What are these reasons? Say whether you agree or disagree with one of these reasons, and why. (150 words)**

A successful answer to this question consists of a complete and accurate summary of the three reasons Cain discusses and a thoughtful analysis of just one of these reasons.

[Two mistakes were common in framing an answer to Q1. One was to think that these are Cain's reasons for being skeptical of the possibility of cognitive science. In fact, Cain does not agree with these reasons, but discusses them critically to shed light on the foundations of cognitive science. The second common mistake was to try to analyze all three reasons. Trying to accomplish this in a short answer of 150 words tends to lead to superficial answers that, for example, ignore important distinctions, considerations, or objections. Lesson: Do not try to do too much in the space of a short question or essay assignment.]

Here is an example of a complete and accurate summary of these three reasons:

First reason: Substance dualism is the view that the mind is non-physical and completely distinct from the physical body. According to substance dualism, what distinguishes the two is that the mind has no spatial extension and is not subject to mechanistic laws, whereas the physical body has spatial extension and is governed by mechanistic laws. The first reason claims that science requires mechanistic laws, and the mind is not subject to such laws, therefore cognitive science is impossible.

[Many responses did not completely and accurately summarize the first reason. One common approach was simply stating that substance dualism posits that the mind and body are completely different, and concluding that therefore cognitive science is impossible. But this is a logical non-sequitur (the conclusion does not follow from the premise). It is necessary to explain *why* the body being distinct from the mind would be thought to rule out the possibility of cognitive science. Another common misunderstanding was the idea that substance dualism does not accept that there are causal relations between physical and mental events, and that this is why it would rule out the possibility of cognitive science. But substance dualists do accept such causal relations. Cain's complaint about substance dualism

was that the substance dualist cannot *explain* how these causal relations could work. Since it was very common to choose the first reason to either agree or disagree with, these mistakes were sometimes carried over to the second part of Q1.]

Second reason: The workings of human cognition are beyond our ability to grasp because we are only able to apply human cognition in trying to understand human cognition. This perspective makes cognitive science impossible for us.

Third reason: Cognitive science begins with a commonsense understanding of the mind in terms of entities like *beliefs*, *desires*, and *perceptions*. But these commonsense phenomena are too complex and messy to be adequately studied by a single science. So cognitive science as a unified field is impossible.

The second part of Q1 asks for a critical analysis of one of these reasons. This is an open-ended question that has many possible successful answers. Some examples of potential lines to pursue are as follows:

-Objection to reason 1: Science does not require mechanistic laws. Quantum physics, for example, is an indeterministic scientific theory. Even if the mind has free will and is not mechanistic, a probabilistic cognitive science is still possible.

-Objection to reason 1: Substance dualism is false because it cannot explain causal relations between the mind and body.

-Objection to reason 2: There is no obvious reason given for why the perspective of human cognition would be limited in studying human cognition itself.

-Agree with reason 2: Give some reason why it is impossible to explain human cognition from within the perspective of human cognition.

-Objection to reason 3: Reason 3 merely shows that cognitive science must be interdisciplinary, which it in fact is.

[A common mistake on the second part of Q1 was to give some sort of psychological explanation of why you agreed/disagreed with one of the reasons. (For example: I agree with reason 1 because I like to think that we are different from our bodies.) When you are asked in a philosophy class why you agree/disagree with something, what you are being asked for is to *justify* that judgment, i.e. give a reason or argument in favor of your position.]

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**Q2: What sort of entities did behaviorists think psychology needed to avoid, in order to be scientific, and why? What principles should govern the use of theoretical entities in scientific explanations? (150 words)**

A successful answer to this question includes at least these core elements: (1) A statement that behaviorists thought psychology should avoid any unobservable entities, including theoretical entities and mental representations, for example. (2) An explanation of why they thought we should avoid positing these entities. (3) Either an explanation of the three core principles or virtues of scientific explanations using theoretical entities [namely, simplicity, explanatory power, and coherence], or some argument for non-standard principles other than these three.

An exemplary answer might also connect (3) to (1) & (2), by explaining, for example, how psychology could posit unobservable entities without thereby losing scientific credibility, by following the principles that generally govern the use of theoretical entities in scientific explanations.

[A common mistake involved in (3) was to explain what principles behaviorists thought should govern scientific explanations, including those involving theoretical entities. Instead, Q2 is asking what principles *should* govern scientific explanations. Unless an argument for the behaviorist view was given, simply stating that behaviorists thought we should reject explanations involving theoretical entities would not be a complete answer to Q2.]

There are a few possible good answers as to why behaviorists wanted to avoid unobservables. Here are two:

-Behaviorists thought that there were no scientifically respectable ways of studying hidden, subjective mental states. They rejected introspectionism and psychoanalysis as unscientific. In the absence of other methods, they thought psychology should focus only on externally observable phenomena, like behavior.

-Unobservable, inner mental entities might be associated with dualism of mind and body, a position which many psychologists dismiss.

The three principles or virtues for scientific explanations involving theoretical entities are:

Simplicity: Scientific explanations are better to the extent that they are simpler – positing fewer theoretical entities, fewer distinct kinds of theoretical entities, and making fewer assumptions about those theoretical entities.

Explanatory power: Scientific explanations are better to the extent that they are more explanatorily powerful – explaining more facts, explaining many distinct kinds of facts, and leading us to discover new facts that we had not even considered before (by generating novel predictions).

Coherence: Scientific explanations are better to the extent that they fit in better with existing, well-established facts and theories.

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**Q3: Why might the study of visual illusions and similar phenomena—cases where perceptual processing goes "wrong"—be particularly fruitful for the study of the mind? (150 words)**

This is a fairly open-ended question with many potential successful answers. Here are some examples:

-Visual illusions are fruitful for the study of the mind because they can help reveal how the mind processes the information that is given by visual perception. A visual illusion like the Necker Cube presents us with a single visual stimulus, but that single stimulus can be perceived in two different ways. This reveals that the information given by visual perception is processed, since a single source of information can lead to distinct representations. Perhaps by studying when perception goes wrong and fails to correspond to external reality, we might be able to uncover how the mind processes visual information even when this process succeeds.

-Visual illusions and similar phenomena are fruitful in revealing which mental systems are modular and the extent to which they are modular. For example, in the Rotating Snakes illusion, we visually perceive movement occurring in the image. This perception persists even after we come to understand that there is actually no movement occurring. The information that there is no movement occurring does not appear to be accessible to our visual perceptual system. This supports the idea that there are multiple distinct mental modules for information processing that cannot always communicate with each other.

-Visual illusions and similar phenomena are fruitful for exploring the workings and relationship between system 1 thinking and system 2 thinking. Visual perception is an example of system 1 cognition, since it is fast, effortless and automatic. In the Muller-Lyer illusion, we visually perceive that some of the lines are longer than others, and this judgment is made quickly and automatically. Though we can learn via a system 2 process that the lines are in fact of equal length, the illusion of some lines being longer persists. This

demonstrates how information from system 1 is not easily overridden by information from system 2.

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**Q4: Cain discusses the functionalist theory of mental states. What is it, and how is it a less "chauvinistic" theory of the relationship between mental states and brain states than the type-type identity theory? (150 words)**

The functionalist theory states that types of mental states, like beliefs, fears, hopes, and desires, are essentially defined by functional roles. These functional roles identify the causes that give rise to the mental state in question, and what the mental state in question gives rise to in turn. For example, fear might be described as essentially being the mental state that is caused by a perception of something that one judges to be a threat, and that causes a fight, flight, or freeze response. Crucially, the particular token state that plays this functional role might be physically different across different kinds of organisms. For example, in humans, the token state that plays the functional role of fear might consist of neurons, whereas a sufficiently advanced robot might have a token state playing this role that consists of silicon. This is known as the multiple realizability of mental states in terms of physical states.

Whereas functionalism defines mental states in terms of functional states, the type-type identity theory defines mental states in terms of specific physical states. For example, the physicalist might describe fear as essentially involving some sort of activity in the amygdala. So the functionalist and the type-type identity theorist disagree about the relationship between mental state types and physical state types. The type-type identity theorist says that for a given mental state, there is just one physical state that is identical to it. The functionalist says that for a given mental state, there are many potential physical states that could play the functional role that essentially defines that mental state.

This last point brings out what is "chauvinistic" about the type-type identity theory but not functionalism. The type-type identity theory elevates humans above any other kind of organism. For it implies that only an organism with the same physical constitution as a human could have the physical states that define mental states. This would rule out the possibility of organisms physically different from us having mental states, such as some kinds of animals, advanced AI, or aliens. But for the functionalist, the only thing that is required to have mental states is to have some physical state or another that plays the functional role that essentially defines mental states. This makes room for the above possibilities.

[A common mistake was to understand functionalism as the claim that some physical states cause some mental states, or vice versa. But that is not the characteristic claim of functionalism. Rather functionalism is the idea that *mental states are essentially defined by their functional (or causal) role.*]