

Input-Output Functionalism and Underdetermination in Consciousness Science

概要

Essentially, input-output functionalism evaluates consciousness in other systems based on the functions displayed in those systems. This view is explicitly advocated by Cohen and Dennett (2011), who consider unscientific any theory that attempts to explain consciousness without exclusively relying on functions. It is also implicitly supported by Doerig and colleagues (2019).

特徴

- While consciousness science is arguably at a pre-paradigmatic stage, this view is generally widespread in contemporary neuroscience of consciousness, with most theories adopting a functionalist perspective.
- Input-output functionalism presents severe problems, from risking collapse into behaviorism, to leading to misguided considerations on falsificationism, to committing the fallacy of misplaced objectivity.
- It is not a trivial question to ask about the capacity of input-output functionalism to discriminate between conscious and unconscious systems in a world where technological advancements have introduced artificial systems capable of mimicking complex cognitive functions.

今後の展開

- To explore another shortcoming of input-output functionalism when applied to clinical cases beyond thought experiments, demonstrating how input-output functionalism is underdetermined.

テーマ「万博、そしてその先へ ～科学技術が描く未来～」との関連

- 今回の万博のテーマは「いのち輝く未来社会のデザイン」であるが、それぞれのいのちが異なる主観世界を持っている。お互いの主観経験がより良く理解できるダイバーシティ未来社会を、科学的手法で推進する礎となる理論を構築したい。

Intrinsic Universal Structure vs Extrinsic Local Functions

Kahn B. A landscape of consciousness: Toward a taxonomy of explanations and implications. *Prog Biophys Mol Biol.* 2024 Aug. Picture by Alex Gormez-Martin.

We need a theory to be able to make inferences in less known cases.

Can consciousness be separated from function?

"We argue that all theories of consciousness that are not based on functions and access are not scientific theories. [...] A true scientific theory will say how functions such as attention, working memory, and decision making interact and come together to form a conscious experience" (Cohen and Dennett, 2011)

Figure 1. A graphic depiction of the perfect experiment. When presented with a red apple there will be normal activation of the motor areas of the brain, but without conscious input and activation. The brain will be in a state of unconsciousness. The brain will be in a state of unconsciousness. The brain will be in a state of unconsciousness.

Functionalist Paradigms to probe consciousness in unresponsive patients

Owen et al. 2005, revolutionized the taxonomy of conscious states by introducing the tennis paradigm, by being able to conduct interviews with patients diagnosed as UWS and introducing minimally conscious states.

However, by relying on functions the tennis paradigm is susceptible of false negatives.

A Challenge for Radical Functionalism: Input-Output equivalence in non-responsive patients

A widespread Cognitive Bias in Consciousness Science

Proponents of the most radicals functionalist approaches may be affected by a cognitive bias: the substitution bias.

"When faced with a difficult question, we often answer an easier one instead, usually without noticing the substitution" (Kahneman, 2011)

Structural alternatives

Integrated Information Theory proposes to study the structure of conscious experience and the underlying Cause-Effect Structure of its physical substrate. (Picture from Elia et al. 2021)

A proxy for Integrated Information obtained by combining TMS and EEG allows to make reliable assessments of consciousness in non-responsive patients (Casali et al. 2013).