Computationalism: Still Cool after All These Years

Marcin Miłkowski
Institute of Philosophy & Sociology
Polish Academy of Sciences
Presentation Plan

(1) Motivation for computational accounts of consciousness

(2) Alternative accounts: are they really non-computational?

(3) Computational explanation of consciousness is still the best game in town
Motivation for Computationalism

• To explain consciousness, like any biological phenomenon, you should explain (cf. Tinbergen 1963):
  • Its function
  • Its evolutionary origin (phylogenetically)
  • Its mechanism
  • And its development (ontogenetically)
Motivation for Computationalism

Functions of consciousness:

- Process information about environment, including planning actions and perception
- Process information about the bodily states, including pain
- ...

Its mechanism

- Must be able to process information
Motivation for Computationalism

- While there are many notions of information, they usually don’t explain **processing** in a general way:
  - Shannon’s theory is about information transfer in a noisy channel
  - Semantic information theories do not specify the information flow in sufficient detail as to re-implement it as a mechanism
Motivation for Computationalism

- To explain the mechanisms of information processing, you can use:
  - Control theory (or cybernetics)
  and / or
  - Computational structures
Motivation for Computationalism

- To explain the mechanisms of information processing, you can use:
  - Control theory (or cybernetics)
  and / or
  - Computational notions

But they both work on slightly different levels. Specifying algorithms in control theory is cumbersome, for example.
Motivation for Computationalism

Computational explanation is general enough to explain complex information-processing mechanisms. It includes analog and digital computation.
A Worry for Computationalism

- The universality of computational and information-processing explanation may lead to vacuity.
- The notion of computation should not be too broad!
- It's not clear how computation would help explain phenomenal qualities of experience.
A Worry for Computationalism

Computational explanation is valuable only iff:

- It has explanatory and predictive value
- Is applied consistently and coherently
- Is simpler than other mechanical explanation
- It explains a relatively isolated system, not an aggregate of parts
- Computational parts are identifiable on lower mechanical levels
- Is given in detail as algorithm (code)
Digital and Analog Computation

- The algorithm can be specified “intensionally” both in terms of digital machines or analog machines.
- In my account, both digital and analog computation can be subsumed under a broader notion of computation.
- It includes different kinds of computation, including connectionist, or symbolic (anything computer science teaches you about).
Computational Explanation

• If you think that consciousness is not epiphenomenal, you need to explain its functions, including information processing.

• To do so, it’s best to use computational explanation of the underlying mechanisms.
Alternative accounts

• Three cases:
  • Quantum theories of consciousness (Hameroff)
  • Intrinsic properties in (proto)panpsychism (Chalmers)
  • Radical externalism (Manzotti)
Quantum Consciousness

- Quantum effects in the brain are supposed to explain why brains are better than computers...
- In terms of computational power
- So it’s just a kind of computational explanation
In Chalmers’ account, intrinsic properties are not everything to what consciousness is.

Computation is the foundation for cognitive sciences in his account, and they explain the extrinsic properties of consciousness (easy problems).

So it doesn’t deny computationalism.
Radical Externalism

- Consciousness as a non-representational process between environment and the brain (e.g., Manzotti)
- All conscious processes modeled after perception (memory as delayed perception)

BUT
- Perception and its mechanisms remain unexplained (maybe control theory?)
Really alternative accounts?

- In two cases, computational explanation is basic
- In one case, one is left without any detailed explanation...
Still the Best Game

- Computational explanation remains the best tool for explaining complex information-processing systems
- It’s **never** the only explanation for any physical system but **necessary** in case of many
- For example, it doesn’t furnish the notion of semantic information (needed for symbol grounding)
The End :)  

Thank you!  
http://marcinmilkowski.pl