

I want to thank Reviewers for taking the time to read the paper and for providing with immensely helpful comments and suggestions. I have applied all propositions of Reviewers 1 and 2 and additionally modified section 2 in response to comments from another reader of the paper (the argument that Muller and Hoffmann accept a semantic view of computation should be now better supported by the analysis of their claims). Below I summarize changes made in response to the Reviewer 1 comments.

Original comments are in bullet points, my responses are in normal text and quotes from the revised version of article are in blue font.

Reviewer 1.

- Somewhere in the manuscript, it could make sense to include some discussion of Randall Beer's simulations of "minimally cognitive systems" (e.g., Beer & Williams, 2015, Cognitive Science).

I want to thank the Reviewer for suggesting the inclusion of this paper. It has helped me to better substantiate the discussion of computational enactivism in section 6. I have included the following paragraph in the revised version of the manuscript:

An argument similar in spirit may be found in a paper by Beer and Williams [80]. The authors develop computer simulations of simple agents that are evolved to perform a categorization task. They analyze these simulations using the tools of information theory and dynamical systems theory—tools which are traditionally connected with the deeply opposed theoretical strands in philosophy of mind and cognitive science: computationalism and the embodied mind theory, respectively. They conclude that these two forms of mathematical descriptions are precisely that—different mathematical languages that can be used to elucidate different properties of the systems under study. These languages are not at odds, and although they have different purposes, their descriptions are often consistent and complementary. Crucially, this arises from a similar methodological approach as the one suggested here, namely from focusing on a "minimal" system which exhibits sufficient complexity of behavior to be considered under the cognitive lens, but at the same time is simple enough to be amenable to a fine-grained analysis, including empirical studies in the lab.

- When Section 3 introduces "vehicles", it might be wise to provide a definition of vehicles for some readers.

I'm grateful to the Reviewer for pointing this out, I've added the following definition of the term and added several references throughout the text to clarify some of the discussions of morphological control:

Computational vehicles are symbols over which the computation is performed. These are encoded in a particular physical medium, but most theories of computation take this medium to be relevant only insofar as computational rules are specific to differences between different portions of the vehicle, along one dimension of variation (single physical property). For example, in the case of neural computation, neuronal spike trains are the vehicles, but computation is often taken to refer to their medium-independent properties, such as spike rates.

- In Section 4, when mentioning the Watt governor, it might be worth noting that Tim Van Gelder (1995, J. Philosophy) used the Watt governor as his “poster-child” for a representation-free dynamical control system.

I have included a reference to the Watt governor, however I decided not to include a more extensive discussion of the role of this example in the philosophy of mind and cognitive science, as it would go well beyond the scope of the current paper. The example was initially intended to help a reader familiar with this literature follow my argument, however I agree with the Reviewer that the origin of this example should have been explicitly noted.

- In the last two paragraphs of section 4, it might be helpful to remind the reader of exactly how none of Müller and Hoffman’s examples would qualify as morphological control.

I have significantly edited this part of section 4 in response to comments I received from another reader of the paper. I hope that these modifications foreground also in what way the examples from Muller and Hoffmann do not qualify, in my view, as morphological control.

- In Section 5, the second paragraph refers to an “explicit statement” attributed to Brenner about morphogenesis and computation, and a couple paragraphs later it is referenced as the “aforementioned quote originally due to Brenner.” However, the way these paragraph are written, I’m not sure I know what that explicit statement or quote from Brenner is. Perhaps it could be better foregrounded in the prose with quotation marks around it.

I’m grateful for the Reviewer for pointing this out, I believe that at some point during editing I have entirely removed the quote that was supposed to appear there. This has now been fixed and the sentence reads as follows:

One of the earliest explicit statements of this perspective comes from Wolpert and Lewis [43, p. 21], who attribute the following question to Sydney Brenner: "is the adult [organism] computable from an egg?"

Minor comments:

- In the third paragraph of Section 2, the author refers to himself as “we” but at the end of section 3, he refers to himself as “I”. Please pick one and be consistent throughout the manuscript.

I’m grateful for pointing this out, I have now carefully edited all references to the author of the paper to be consistent. I believe the instance of “we” that the Reviewer points out was within a quote from Muller and Hoffmann, hence for clarity I modified the formatting of that paragraph so that the quote is now formatted as a block quote.

- Halfway thru Section 3, there’s a sentence beginning with “Milkowski [13, pp.77-78] explicitly touches upon...” that is probably a run-on sentence. It might be good to find a way to carve that sentence into two sentences.

Thank you for pointing this out, I have now corrected the sentence and it reads as follows:

Milkowski [13, p. 77-78] explicitly touches upon the topic of morphological computation. He argues that given a mechanism which is (evolutionarily) designed to perform the function of processing information and that can be clearly individuated (as is the case in biological systems, with delineated

cells, tissues etc.), the computational function can be ascribed to it. It doesn't matter whether this function is performed thanks to the morphological features in a physical, analogue way, or thanks to some other (possibly medium-independent) properties of the system. Miłkowski builds on the example of mechanism of pressure-difference receiver in crickets [cf. 22], a case resembling that of the eye of the fly—so a case of morphological perception in Müller and Hoffmann's framework.