# Review of: "The functional unit of neural circuits and its relations to eventual sentience of artificial intelligence systems"

Jory Schossau[1]

1 Michigan State University

Potential competing interests: No potential competing interests to declare.

The authors discuss a model for a functional unit of computation and representation that has biological grounding. They argue that this model is important because although it can adapt and recall information like other models, it allows for oscillations and closed-circuit dynamics that could generate electromagnetic fields, which might be important for self-awareness. The authors go into detail about their prior model called “equi-me-rec” and provide decent reasoning why the model is interesting if electromagnetic fields are critical for self-awareness. The topic of self-awareness is definitely interesting in the field of Artificial Intelligence.

There are several weaknesses the authors should address to strengthen the article:

- There are no new quantitative results presented - it covers the prior model conceptually but does not provide new data, experiments, or simulations.
- There are no testable hypotheses presented related to the critical aspect of the article about self-awareness or electromagnetic fields.
- Much of the article connects the prior model to conceptual arguments around consciousness, the electromagnetic field, and implications for AI. This has an opinion-based tone, not a scientific tone.
- Frequent use of tentative language like "probably" and "it appears", indicates an extension of opinion-based hypotheses, not hard conclusions.
- Their original model publication from 1990 contains the substantive prior description and proposal of the equi-me-rec model itself, most of which is repeated in this article for ease of reading, but seems presented as if it is new.
- The article title says “The functional unit of neural circuits…” as if that is what the article is about, rather than “The **relation** of the functional unit…”
- There are a number of formatting and grammatical issues that are big enough to cause the reader confusion and increased cognitive load while trying to parse the text.
- There seems to be some confusion about online learning and offline learning, and especially about the Mary Webb reference that points out that backprop connections in standard ANNs are for the training (offline) phase, whereas the authors' model appears to be tailored for an online learning context, so the comparison is disjoint. The authors appear to be making an apples & oranges comparison of their online learning model to systems designed for training and then inference, rather than discovering an omission about systems capable of continual learning that neglect to diagram the

backprop connection.

Overall, this article is nicely summarized by its concluding paragraph, and specifically its concluding sentence, which could also nicely serve as the article's title:

> *“backward connections are probably a necessary condition for the development of self-aware artificial intelligence systems”*

but unfortunately, this is a completely unfalsifiable statement.