Reviewer’s report

Title: What is it like to use a BCI? – Insights from an interview study with brain-computer interface users

Version: 1 Date: 18 May 2019

Reviewer: Adrian Carter

Reviewer's report:

This paper reports findings from a series of qualitative interviews with people who have received a BCI to understand their views on the technology and their hopes and concerns. This is an important addition to the literature around the clinical and ethical issues that the technology raises. However, there are a number of serious issues with the paper that need to be considered before it would be suitable for publishing.

Introduction:

I found the background material a little difficult to follow. I think that the information and studies reported needs to better demonstrate the link to and the rational for the research questions examined during the interview. For example, I am unsure what "observations and perceptions that they had made with BCIs" entails precisely.

The introduction also needs to include a brief discussion of how the different BCIs work and what they allow.

The overall writing and expression of this section was a little hard to follow and could be edited for clarity.

Methods:

I appreciate that the recruitment from this population was difficult. However, I think the language referring to it as "tedious" is not fitting for an academic journal. I was also disappointed to read that this is why the authors interviewed caregivers or relatives. There is great value in researching this population. I think that you need to provide a better rationale for speaking to these individuals.

Sample size: Recruitment of only 2 caregivers or relatives is problematic. This represents a separate population and I imagine that it would have been possible to recruit a larger number. What methods were used to determine sample size? Did the authors employ saturation of themes? The sample size needs to be justified.
Consent: I assume that they provided consent prior to the interview starting? It currently says that they consented during the interview. The interview should not commence until consent is given.

Participants: I would have liked to have read more about what BCI devices were part of the inclusion criteria. And why these devices?

Analysis: There is insufficient detail about the method of analysis used in the study. The abstract and methods briefly refer to Grounded Theory but there is no discussion of what this is and why it is appropriate and how it was undertaken.

Results and Discussion:

I don't think it is necessary to footnote the reason for combining the results and discussion. It would be wrong to say that qualitative research requires the combining of these sections. It doesn't. It is commonly done. Either approach is fine.

There needs to be greater explanation of the different types of BCIs and how they may impact on the different themes emerging from the data. The study includes a wide range of BCIs that are going to give vastly different experiences, particularly in terms of the research questions posed (e.g. agency, machine-person relationship etc.). For example, the experience of agency will be different with different devices used and in different conditions. It makes it difficult to draw conclusions about the origin of the different experiences discussed in the paper.

Similarly, differences in the training involved appears to play an important role in their feelings of participation. Some like Nicole had &gt;100 training sessions and was clearly a crucial player in the study team; others had the one. I think there needs to be greater explanation of how this can be different for different devices.

On line 138 the authors state that a patient's understanding of the technology is necessary to experience agency. Why is this the case? I don't really understand how a car works, but I feel like I am driving it. Can you demonstrate this through your data? The matching of intention to action seems far more relevant.

The theme about participation also seems to be about recognition form others as a result of participation, as much as it is simply about the internal benefit of being involved. For instance, the discussion about the novelty of the tech is not about participation. This statement also seems to come out of nowhere. There wasn't' much discussion of what participation meant to them or how it impacted on their lives through specific examples.

The self-definition theme covers a wide range of ways and factors that define us (e.g. relationship with caregiver, relationship to robotic device and BCI, being a useful contributor to society etc.). The section appears to jump from one meaning to another without any sort of structure. Some consistency or demarcation of the different uses would be helpful and make it seem like there is a coherent narrative being told.
Line 355: I do not understand the meaning of this sentence. How is what a BCI requires relevant? The discussion of "brainification" appears to come from out of the blue. Brain activity is clearly important to how a BCI operates, but the authors seem to be reducing the hopes and identity of users to the brain, when the data they have presented appears to show how it is the personal and social factors that provide far more meaning to them.

Similarly, the discussion about the role of emotions is not clear. What is the relevance of the need or challenge in suppressing emotions to operating the device?

It is not clear from table 1 which are the relatives or caregivers. It is wrong to group them without distinguishing between them in the table and analysis.

Ethical implications:

I was hoping that this section would tie all the themes together to provide some clear guidance about a set of ethical or practical issues that BCIs raise. However, it appears to be a further discussion or restatement of the findings already presented. The ethical issues that the findings speak to need to be more clearly laid out. New issues are introduced in this section that should have been mentioned earlier (e.g. cyborgisation).

Conclusion:

The conclusion introduces new ideas that have not been mentioned previously or were only mentioned in passing (e.g. data theft). They raise the issue of regulation and the ethical concerns described in the literature by ethicists, however these are not discussed in detail in the paper.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

Not relevant to this manuscript

**Quality of written English**
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

**Declaration of competing interests**
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license ([http://creativecommons.org/licenses/by/4.0/](http://creativecommons.org/licenses/by/4.0/)). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal