**Rebuttal Document**

**ARTICLE TITLE:**

A research protocol for studying brain function in children using magnetoencephalography

**AUTHORS AND AFFILIATIONS:**

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**4th December 2018**

**Editorial comments:**  
  
1. One of the authors has a UK affiliation; please have them sign the UK ALA (attached) and include it with your revised submission; in particular if they receive funding from a UK agency.

**This author (Robert A. Seymour) has signed the UK ALA, which is attached with our revised submission.**

2. Figure 1F: Please explain the 2 halves of the image shown in this panel.

**We have updated Figure 1 such that panel F now only has a single image of the normal screen view.**

3. Figure 2: The legend for this is still somewhat unclear-please explicitly state what each part of the figure is.

**We have explained explicitly in the legend of the figure 2 about what each part of the figure is.**

4. Have you received informed consent regarding the photos of children in Supplemental Figures 1 and 2? Please indicate if so.

**A photo consent form, covering both Supplemental Figures 1 and 2, is attached.**

**Note: As we could not track down the consent form for the photo in Supplemental Figure 2 (an old photo of a little girl), we have replaced the photo with one that is covered by the attached consent form. A new version of the Supplemental Figure 2 is attached.**

**7th September 2018**

**Editorial comments:**  
Changes to be made by the Author(s):

1. Please take this opportunity to thoroughly proofread the manuscript to ensure that there are no spelling or grammar issues.

**We have proof-read and corrected the manuscript for spelling and grammar issues.**

2. Please print and sign the attached Author License Agreement - UK. Please then scan and upload the signed ALA with the manuscript files to your Editorial Manager account.

**The ALA is attached.**

3. Figures 1 and 2: Please move them to supplemental files.

**Moved to supplementary files and changed in text.**

4. Figure 3: Please use screenshots instead of taking images of the computer screen.

**We have tried our best to improve the quality of this figure. Please find our detailed response to the same comment raised by Reviewer #1 below.**

5. Please adjust numbers following author names to indicate different affiliations. Numbering follows the order of authors. First author gets 1, next author with different affiliation gets 2, etc., following from first to last.

**The numbers are in the correct order now.**

6. Please revise the protocol text to avoid the use of any personal pronouns (e.g., "we", "you", "our" etc.).

**All personal pronouns have been removed from the protocol text.**

7. Please revise the protocol to contain only action items that direct the reader to do something (e.g., “Do this,” “Ensure that,” etc.). The actions should be described in the imperative tense in complete sentences wherever possible. Avoid usage of phrases such as “could be,” “should be,” and “would be” throughout the Protocol. Any text that cannot be written in the imperative tense may be added as a “Note.” Please include all safety procedures and use of hoods, etc. However, notes should be used sparingly and actions should be described in the imperative tense wherever possible.

**The protocol now only contains action items. Any text that could not be written in the imperative tense has been added as a “Note”. Notes have been used sparingly. Phrases, such as “could be,” “should be,” and “would be”, have been removed.**

8. The Protocol should contain only action items that direct the reader to do something. Please move the discussion about the protocol to the Discussion.

**All discussion items that were previously in the Protocol section have been moved to the Discussion section.**

9. The Protocol should be made up almost entirely of discrete steps without large paragraphs of text between sections. Please simplify the Protocol so that individual steps contain only 2-3 actions per step and a maximum of 4 sentences per step. Use sub-steps as necessary.

**The protocol items have been simplified to 2-3 actions per step, with a maximum of 4 sentences per step.**

10. Please include single-line spaces between all paragraphs, headings, steps, etc.

**Single-line spaces have been added.**

11. After you have made all the recommended changes to your protocol (listed above), please highlight 2.75 pages or less of the Protocol (including headings and spacing) that identifies the essential steps of the protocol for the video, i.e., the steps that should be visualized to tell the most cohesive story of the Protocol.

**Highlighting has been completed.**

12. Please highlight complete sentences (not parts of sentences). Please ensure that the highlighted part of the step includes at least one action that is written in imperative tense.

**Full sentences have been highlighted. All highlighted parts include actions.**

13. Please include all relevant details that are required to perform the step in the highlighting. For example: If step 2.5 is highlighted for filming and the details of how to perform the step are given in steps 2.5.1 and 2.5.2, then the sub-steps where the details are provided must be highlighted.

**All relevant details are highlighted.**

14. JoVE articles are focused on the methods and the protocol, thus the discussion should be similarly focused. Please revise the Discussion to explicitly cover the following in detail in 3-6 paragraphs with citations:  
a) Critical steps within the protocol

**We have emphasised the critical steps within the protocol (i.e., familiarisation resources and session, and movement detection/correction system).**

b) Any modifications and troubleshooting of the technique

**This is addressed in the Representative Results section (“1. Common Magnetoencephalography signals”), which details several causes of signal interference and advises on how to resolve the interference.**

c) Any limitations of the technique

**We mention the main downside of this protocol in the Discussion, namely the additional time that researchers and families would need to devote to the experiment with the inclusion of the MEG familiarisation session.**

d) The significance with respect to existing methods

**We mention the significance in the final paragraph – namely that our protocol will hopefully improve paediatric MEG data quality, which will improve our understanding of early brain development.**

e) Any future applications of the technique.

**We suggest, in the final paragraph, that implementing these protocols will improve the quality of future paediatric MEG data.**

15. References: Please do not abbreviate journal titles.

**Abbreviations have been removed and journal titles are written in full.**

**Reviewers' comments:**  
  
  
**Reviewer #1:**  
Manuscript Summary:  
The manuscript presents a research protocol to perform MEG recordings on pediatric population while reducing head movement artefacts. The head movement minimization is carried out by training the children to stay still during the recording (thanks to a MEG familiarization session prior to the recording session), as well as by using a real-time head movement tracking system to correcting for residual artefacts. The manuscript is very well written and easy to read.  
  
Major Concerns:  
The quality of Figure 3 **[now labelled Figure 1]** must be improved. This figure is meant to show differences in the MEG signals when affected by specific noise sources, however the quality of all the panels is very low:  
- some writings are cut or out of focus;

- signals appear sideways in some panels (A and C);  
- the amplitude scale and the time scale are not always reported;  
- in panel F is not clear what two different windows are showing.

**This figure is now labelled Figure 1 in the manuscript. We have deleted the text that was out of focus. We have tried our best to improve the quality of this figure by replacing panels A, B, and D with screenshots as suggested. Regarding panels C and F – unfortunately we do not have this data saved, and recreating these interference signals would be harmful to the MEG system. We also believe the two window view in panel F facilitates a better overview of this particular type of noise, i.e., where all channels are collapsed on the left side and where a single channel is affected on the left side. The amplitude scale in panels A, B, and D are all in place now, whereas the amplitude scale in other panels is in A/D unit and is now reported in the title of the figure.**

Previous works describing the importance and the clinical use of MEG in pediatric population should be properly cited, such as Gaetz et al. (2015) and Papadelis et al. (2013).

**We have cited these key references in the Introduction section.**

It would be also interesting to see the difference in the source reconstruction results, before and after the compensation for movement-related artefacts.

**We have now added the source localisation results in the revised Figure 2. Please note for simplicity we removed the motor response data since the movement-related confounds were not clear.**

The discussion should be expanded, by including a discussion on which are the most critical steps in the protocol and which are the limitations.

**We have expanded the discussion and included an emphasis on the critical steps within the protocol (namely, the familiarisation resources and session, and movement detection/correction system).**  
  
  
**Reviewer #2:**  
Manuscript Summary:  
The manuscript describes their protocol for successfully collecting MEG data from young children. It is well-described and likely useful for the field. The manuscript is well-written and the figures provide useful information that will help others follow a similar protocol. The methods used are consistent with other labs and are expected to be useful for individuals new to pediatric MEG.  
  
Major Concerns:  
no major concerns  
  
Minor Concerns:  
no minor concerns.