Author's response to reviews

Title: The Argus II prosthesis facilitates reaching and grasping tasks: a case series

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Author's response to reviews: see over
Dear Erica Cruz

RE: MS: 1422423682119906  Research article

The Argus II prosthesis facilitates reaching and grasping tasks: a case series

Aachal Kotecha, Joe Zhong, David Stewart and Lyndon da Cruz

BMC Ophthalmology (Section: Retina)

Many thanks for reviewing our manuscript. We have carefully read the reviewers’ comments and have addressed them point-by-point, highlighted in blue in this letter. Changes to the manuscript have been highlighted in red font.

We hope our responses have adequately addressed the reviewers’ concerns.

With many thanks

Yours sincerely

Aachal Kotecha PhD

on behalf of all authors
Reviewer: Sunir Garg

Response: We would like to thank the reviewer for their review of our manuscript.

- Major Compulsory Revisions
The author must respond to these before a decision on publication can be reached. For example, additional necessary experiments or controls, statistical mistakes, errors in interpretation.

- Minor Essential Revisions
The author can be trusted to make these. For example, missing labels on figures, the wrong use of a term, spelling mistakes.

Abstract, methods: consider changing “using six” to “consisting of six”

Abstract, methods: I would end the sentence “...in a randomized order.” Then start a new sentence “Scrambled consisted of a random”

Response: We thank the reviewer for their suggestion and have made changes to the Abstract-highlighted in red font.

Introduction, please change “commonest” to “most common”

Please change “…inner nuclei layer” to “inner nuclear”

Intro, para 3, please add location of Second Sight

Response: We have made these changes to the Introduction- highlighted in red font.

Methods, exploration of reach to grasp ability: bottom of first paragraph: whe does “2x eye condition” refer to?

Response: The 2x eye condition refers to eyes patched or unpatched. However, we have now changed this to read:

(3 prosthesis settings: On, Off, Scrambled; 2 eye settings: Patched, Unpatched; 8 repetitions: 4 in the ‘near’ and 4 in the ‘far’ locations).

- Discretionary Revisions
These are recommendations for improvement which the author can choose to ignore. For example clarifications, data that would be useful but not essential.

Why did patient 7 decline participation in this trial?

Response: All 7 patients were advised that participation was voluntary, and patient 51002 did not wish to participate. In our local research ethic approved ‘information and consent’ form, participants are not required to give a reason for their withdrawal; thus, unfortunately, we do not know why he declined to take part in the study.

Methods, Movements Quantified: It would be interesting to know how these parameters have been validated in other studies.

Response: The parameters studied – movement onset, object contact, time to object contact and path deviation ratio- have been used in previous work investigating reaching and grasping in

It would be interesting to have a photograph of the table/testing area.

Response: We have added a black and white jpeg to illustrate the room set up.

Why were the scrambled results not different from the on position results?

Perhaps it was due to sample size, or due to some other reason.

Response: In our discussion we also raise the point that there were little differences in participant performance between the ‘On’ and ‘Scrambled’ setting. We suggest that this may be because that, even though the Scrambled setting sends a signal identifying the presence of an object in the scene in front, it does not offer enough information that allows an impression of the object form. Thus, under this particular experimental setting, it is likely that the prosthesis was being used to detect the presence of the object on the table, rather than be used to detect shape/size etc.

Discussion, para 2: Please elaborate if appropriate on the difficulties that the patient had with the prosthesis.

Response: We have added the following to the discussion:

“This participant is known to have specific difficulties in using the prosthesis, in that he suffers a loss of connection between the implanted radio frequency coil and head mounted camera, thought to be related to an acquired, intermittent onset, exotropia.”

Discussion paragraph 4: Please clarify “the prosthesis receives a signal, but the ‘Scrambled’ setting does not give full information of the ‘form’ of the object, just an indication that an object is present.” This seems to be a different definition of scrambled that is suggested in the introduction.

Response: When the prosthesis is in the ‘Scrambled’ setting, if the video camera picks up an object, a random scattered signal is presented to the prosthesis. Thus, the wearer becomes aware that an object is indeed present on the table, but is unable to detect its form as such. In contrast, when the prosthesis is in the ‘On’ setting, as the video camera detects the object, the micro array is allowed to function as normal, and thus the level of microarray activity will give some indication to the patient of the form/size/shape etc of the object in front of them.

It would be helpful to expand the figure legends. The information will likely be new for a number of people and additional instruction on how to interpret the
figures will be appreciated.

Response: Done.

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Reviewer: Ahalya Subramanian

Reviewer's report:

Overall I enjoyed reading the article.

Response: We would like to thank the reviewer for their review of our manuscript, and their positive comment.

Methods- All changes required

Please specify why you chose distances of 250 and 450mm.

It would appear that the object was located either 20 degrees to the right or left of straight ahead. Were the subjects aware of this? Why was the 20 degree boundary chosen?

Response: Distances were ‘scaled’ for arm length, such that the participant would not need to excessively overstretch their arm in order to reach the table. Participants were instructed that the object would be placed in one of 4 positions on the table. Twenty degrees either side of the midline was chosen fairly arbitrarily, as we did not want to keep the object in the ‘line of sight’ of the camera. This spacing was used in previous, unrelated, work in our lab. We have added the following to the ‘Methods’ section:

“These positions were chosen to allow for as natural a movement as possible, such that the participant did not have to overstretch their arm in order to reach the object, and because we did not wish for the object to be in the video camera’s ‘line of sight’ at the start of the movement.”

Please specify why a time frame of 30 seconds was chosen.

Response: The choice of recording time frame was arbitrary. We had two things in mind when we chose 30 seconds: firstly, to give them enough time so that they had a chance of finding the object and completing the task, giving them a sense of achievement, but not an excessive amount of time that would lead to experimental fatigue during the overall session. We have added the following to the manuscript:

“The 30 second recording window was chosen arbitrarily to try and maximise the participants’ chances of completing the task, without being so excessive as to result in fatigue over the course of the experimental procedure.”

Page 7 last sentence states that all tests were performed by AK. In the contributor ship statement the authors state that DS also helped acquire the data. Please clarify.
**Response:** Authors DS and JZ were in charge of the applying the prosthesis settings during the experimental procedure. Thus, whilst AK alone moved the objects around the table and instructed the patients, DS and JZ were needed to set the prosthesis up correctly. Hence, they are listed as helping acquire the data.

**Why was a period of 4-6 weeks chosen to retest the participants?**

**Response:** This date was chosen arbitrarily to allow for participant, staff and room availability. It would be useful to mention that most participants had been using the device for several years before the collection of data. It would also be useful to specify if they used the device all the time or did they only use it for certain tasks. Did they for example use the device when they were reaching and grasping in their day to day lives.

**Response:** We don’t have the exact details of how often patients with the prosthesis use the device. The devices were implanted over 3 years ago, and whilst such data was collected at the start of the trial, this information is not routinely collected. They have, however, been advised to use the device for 2 hours per day, but whether this is followed or not is now unclear. However, we have added the following to the Methods section:

“All participants had the prosthesis implanted for a minimum of 3 years prior to participating in the present study.”

**Results- Changes Optional**

Were there any differences in performance based on the ages of the patients?

**Response:** Whilst this is an interesting question, we feel that with the small number of participants in the study, the effect of age of reach performance may yield insufficient information to be a useful sub-analysis.

Successful grasps- For the scrambled condition participants seemed to get worse at the second visit? Is this correct? If so why did this happen?

**Response:** The median number of successful grasps across the whole group indeed changed from 59% to 28% at the second visit. However, if we look at the graphs it appears that this is mainly caused by participants 51005 and 51009 ‘pulling’ the median group success rate down, as they showed reduced success with the prosthesis in the scrambled setting at visit 2. We are unsure as to why this was the case for these 2 participants- it may be that they were beginning to use the prosthesis more as ‘form’ detector (i.e. trying to detect the shape of the object) rather than as an indicator of the presence of the object on the table (when the prosthesis is on ‘scrambled’, it sends a random signal to the microarray when an object is detected by the video camera. But as the signal is ‘random’ and not ‘cohesive’, it would be difficult to judge the shape of the object, and would only indicate that an object is present). However, this is all conjecture and we cannot be certain.

**Discussion- All changes required**
Perhaps reword your first statement “the results of the study....” as it would appear from this statement that participants were always able to successfully grasp the object although this was not always the case.

Response: We have now changed the wording to:

“The results of this study show that the ability of individuals with profound loss of vision to reach and grasp a tabletop object is facilitated with an artificial retinal prosthesis.”

To reflect that success was better with the prosthesis ‘on’ compared to when it was ‘off’.

Page 13 line 16- Delete ‘to’

Response: Done.