

# Response to reviewers

for AMPPS manuscript: Visualisation of Brain Statistics with R-packages ggseg and ggseg3d

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## Reviewer 1

### Major concerns

1. The output of many code chunks are not present to illustrate the concepts described (Pages 5, 9).
2. Many users wish to bring in parcellations from individual subjects processing. For example, freesurfer files or PLY files from some other software. It is not clear if ggseg has the ability to read and then render these, but they are fundamental to this area. Similarly, In this vein, the overall functionality of a user creating their own atlas would be helpful.
3. In this regard, please read in a true freesurfer stats file from the subjects folder installed with freesurfer, and don't use mock data. This will help those using Freesurfer, which is a likely user of these packages.\*\*
4. The interactivity of these tools is essential - link out to interactive examples are necessary.
5. Page 9, Line 34 "It is important to note that the coordinates in the plot (X, Y, Z) are not any type of radiological coordinate system, but arbitrary Cartesian plot coordinates." - it is unclear why this is important - please discuss the significance (such as using this to find ROIs on MNI space, etc).

### Minor concerns

1. Why must you `group_by` and then `facet_wrap` in line 43 page 7? Is the grouping necessary? Line 23, page 7 seems to indicate that it is, but it's unclear why This is a pretty annoying necessity because the function `ggseg` is just a wrapper for `geom_polygon` and we are in a sense circumventing the genius of the grammar of graphics. We added a small section in the manuscript explaining this, and also added a subplot to figure 5, now showing when data is grouped before and if not grouped. `ggseg` will merge supplied data with atlas-data, and then feed that merged data to `ggplot` and `geom_polygon`. This makes some unfortunate changes to the data, so that the entire atlas will not be plotted correctly once provided to `ggplot` and faceted. We also added some text explaining this under the **Creating subplots** heading for `ggseg`.

In regards to the second rule of needing to group the data before plotting, this is due to the underlying structure of how the provided data and the atlas data are combined before plotting. Since the package function, so far, is a wrapper for `{ggplot2}` rather than a `geom`, there is certain `ggplot2`-functionality that is difficult to integrate, like the facets. For the complete atlas-data to be merged with *every data group* correctly, the `ggseg` function needs to have an indication before plotting what the groups are. The result of ungrouped data into `ggseg` is shown in @ref(fig:datasupp3)A. Notice how there are three panels rather than two, and that the regions *not*

*represented in the data* have their own panel with all the grey NA colour, while the panels with the data only have the regions represented in the data.

**2. Can a continuous mapping of triangles be handled? For example, Figure 4 has a parcellation, but can a mapping to each point on the surface be handled? If so, please give example in supplement.** unfortunately no. We are finding it difficult to figure out how the indexing of each individual triangle actually works, and how to map that in a continuous way. We hope to be able to crack that nut in the future, but at the moment we are not able to do so. If we get there, that would be a great improvement to the package as a whole, as it would greatly minimize the data needed to plot and improve speed of plotting, which now can be quite slow for atlases with many parcellations.

**3. Define “glass brains” for the main audience (page 9)** We have added the following sentences below the glass brain subheading

A glass brain is a translucent representation of the brain that can provide a frame of reference, particularly when looking at subcortical parcellations. Since individual brain areas or subcortical structures can be very hard to place without the visual reference of the entire brain, glass brains are often used to aid the viewer understand a regions location. Subcortical atlases include cortical surfaces and other landmark structures for visualization purposes only.

**4. A link to an interactive figure 9 should be provided.** We added a link to the part of the manuscript pointing to Figure 9, linking to the ggseg3d online documentation, which has interactive versions.

**5. Why must title = " " in the code chunks Page (3)** This was something hacky we did to get title alignment and placement to work with cowplot. We switched to patchwork, where this is not needed. We have not made title and subtitle setting in labs that describe the plots very shortly.

**6. The code chunks in Page 3 should be run in the same order as the figure so that readers flipping back and forth do not have to search around, p1, med, combo, p2, left, p3 is the order they are passed, so they should be the order in which they are created. Also A/B/C/etc should be in the code comments, not simply the name, e.g. F: aseg default theme.** We have corrected the figure and code with your comments, and find it much improved.

**7. Why is there an NA in Figure 3?** All cortical atlases have NA for the polygon representing the medial wall, and currently subcortical atlases also have NA for the polygon(s) representing the cortex. This was a design decision we did early on, that areas that are *not* part of the atlas itself should be represented stored as NA , rather than giving them their own fill colour.

## Typos

- extra “s” in pluss in 3rd paragraph (line 55)

Thank you for spotting this, we amended the error.

## Reviewer 2

I have done many R package tutorials, and I saw no issue with this one. I would rank it as intermediate in difficulty because of some setting up additional dependencies such as the remotes package. I think I would especially utilize this package with Freesurfer so the examples provided in congruence with that workflow was useful to me. Code itself was clean, commented, and easy to follow. While much of the work I do is outside of R completely, I could see this being a useful tool for someone who is basing their analyses in that framework. I hope that the contents of this tutorial are being similarly represented on a Git documentation page, as I am sure most users will default to that mode to learn about this package instead of a manuscript. I look forward to the planned improvements that the authors note elsewhere in

the Planned Package Improvements portion of the article and thank them for the open-source distribution of this package.

I can provide to the authors minimally commented code I wrote to follow this tutorial, but would note that most of it overlaps with existing content in the manuscript.