

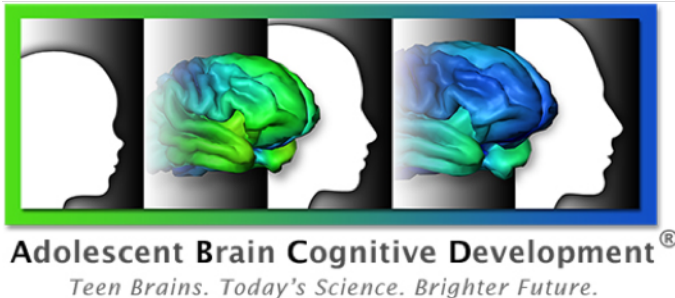
ABCD_QC_Protocol_markdown

February 4, 2020

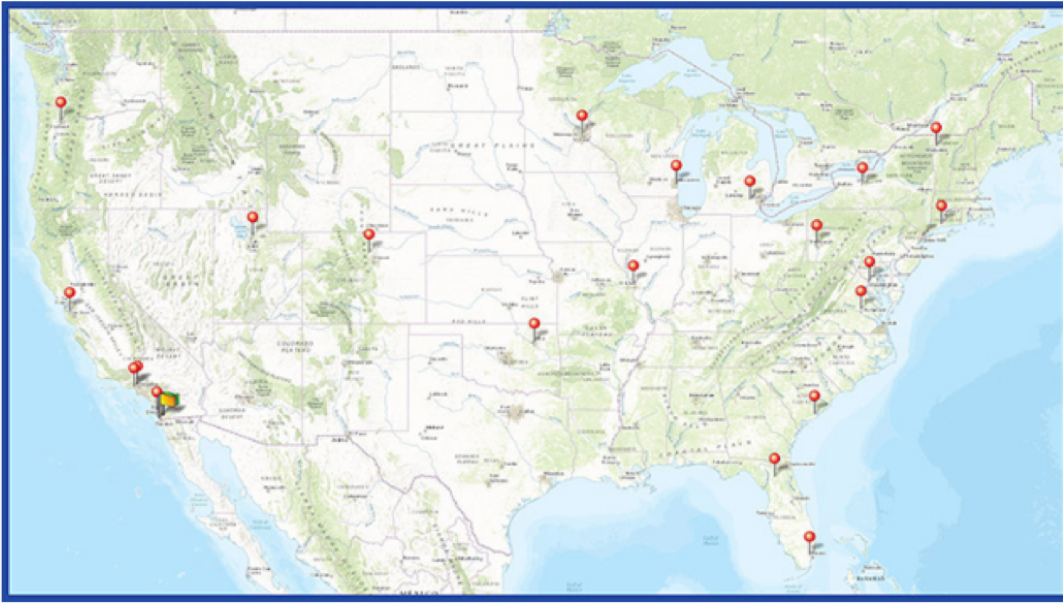
1 Instructions for ABCD quality checking

Written by: Saige Rutherford 11/26/2019

1.0.1 Before we get started...what is the ABCD study?

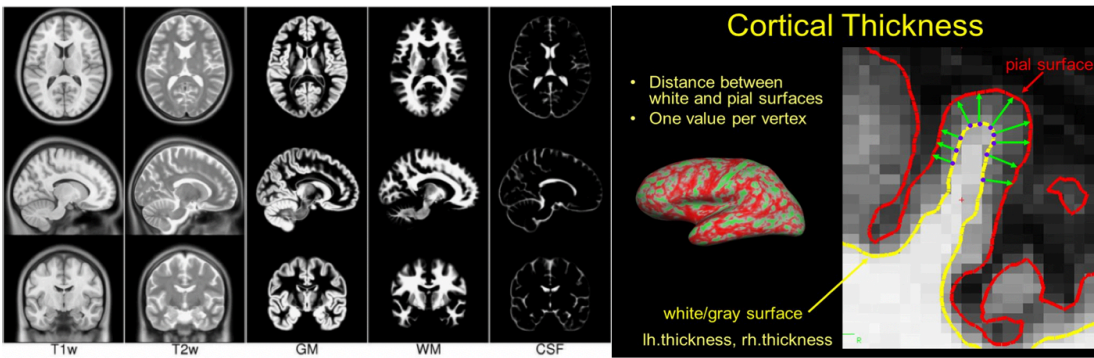


The ABCD Research Consortium consists of a Coordinating Center, a Data Analysis and Informatics Center, and 21 research sites across the country (see map below), which have invited 11,878 children ages 9-10 to join the study. Researchers will track their biological and behavioral development through adolescence into young adulthood. You can learn more about the study on their [website](#) and by watching these short videos by [Elizabeth Sowell](#) and [Sandra Brown](#), [Terry Jernigan](#), and [Mary Heitzeg](#).

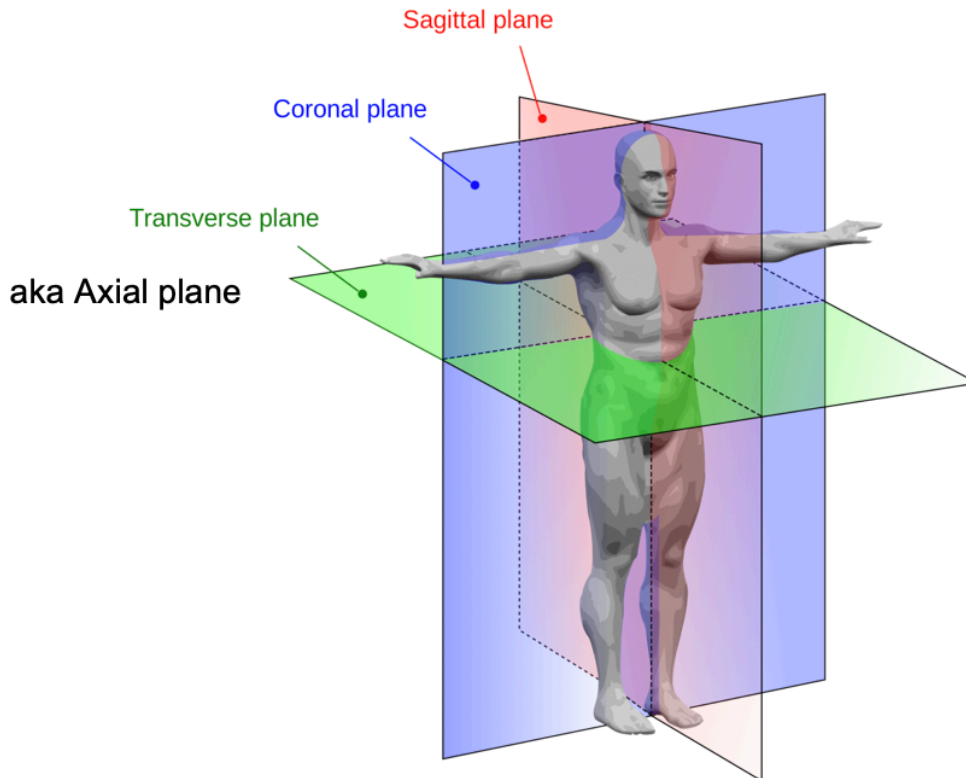


Neuroimaging Terminology

- Pial surface = innermost covering of the brain, boundary of gray matter
- GM = gray matter; WM = white matter; CSF = cerebrospinal fluid
- T1w = anatomical image (CSF looks dark)
- T2w = anatomical image (CSF looks bright)
- MNI = Montreal Neurological Institute, the group template brain
- CheckReg = Check registration of anatomical to functional data
- CheckWarp = Check normalization to template (MNI) space
- Voxel = 3d pixel (unit)



Anatomical planes



1.1 OK, now let's get started quality checking the data!

1.1.1 There are 2 parts of quality checking...

Part 1: Check if any of the preprocessing steps failed. A) Registration between T1w & each mean functional image, a.k.a CheckReg and B) normalization to MNI space, a.k.a CheckWarp

Part 2: Check the quality of the data. fMRIPrep preprocessing outputs a HTML file that contains images and several logs to summarize data quality.

1.2 Part 1 CheckReg Instructions:

1. Check the [google sheets CheckReg file](#) to pick which session file you will QC. You cannot check any session more than once. We will have 3 different raters for each session file. Each QC session contains 100 images. Please do not start a session if you cannot get through 100 images. We estimate it will take up to 30 minutes to get through one session.
2. Open a remote desktop using X2Go (directions for how to connect are [here](#))

3. Open a new terminal window within the remote desktop, go into the correct directory by typing:

```
[ ]: cd /data/projects/abcd_data/Scripts/ABCD-Papaya/
```

4. Run the setup script by typing the command below in the terminal window. Replace CheckReg_000 with whichever session you picked above in step 1. Replace uniqname with your uniqname. This will take about 1 minute to copy the data.

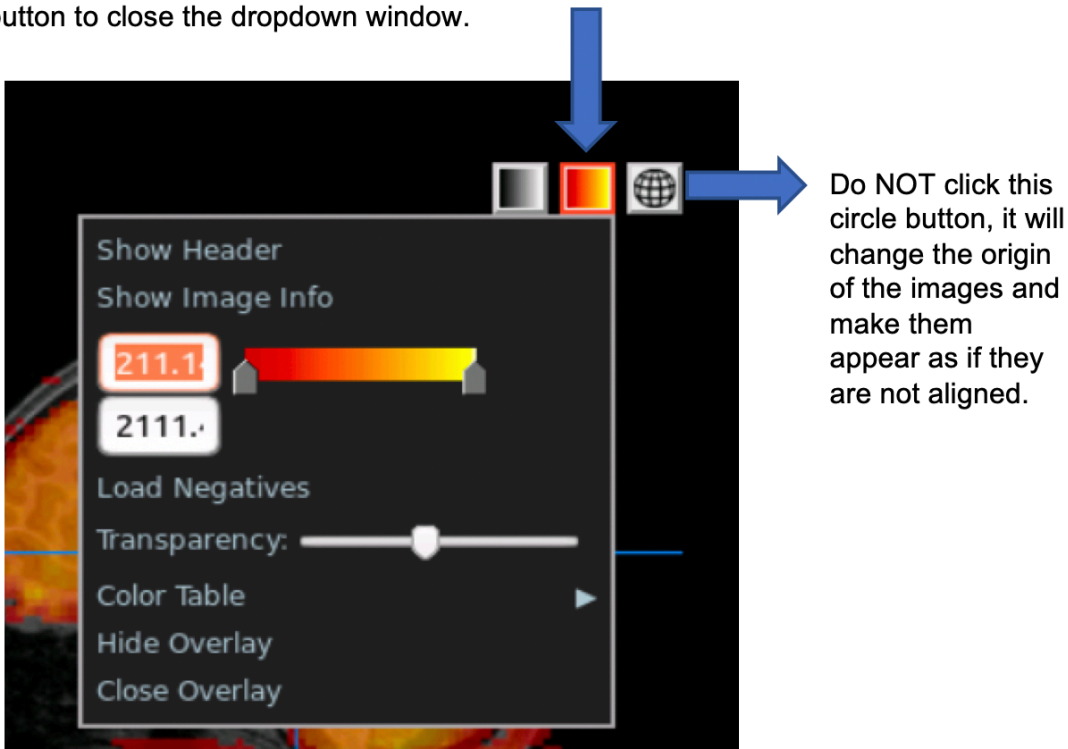
```
[ ]: ./abcd_papaya_checkreg.sh ../../CheckReg/subject_lists/CheckReg_000 /tmp/  
↪ uniqname_tmp
```

5. Then start the viewer (replace uniqname with your uniqname) by typing this in the terminal window:

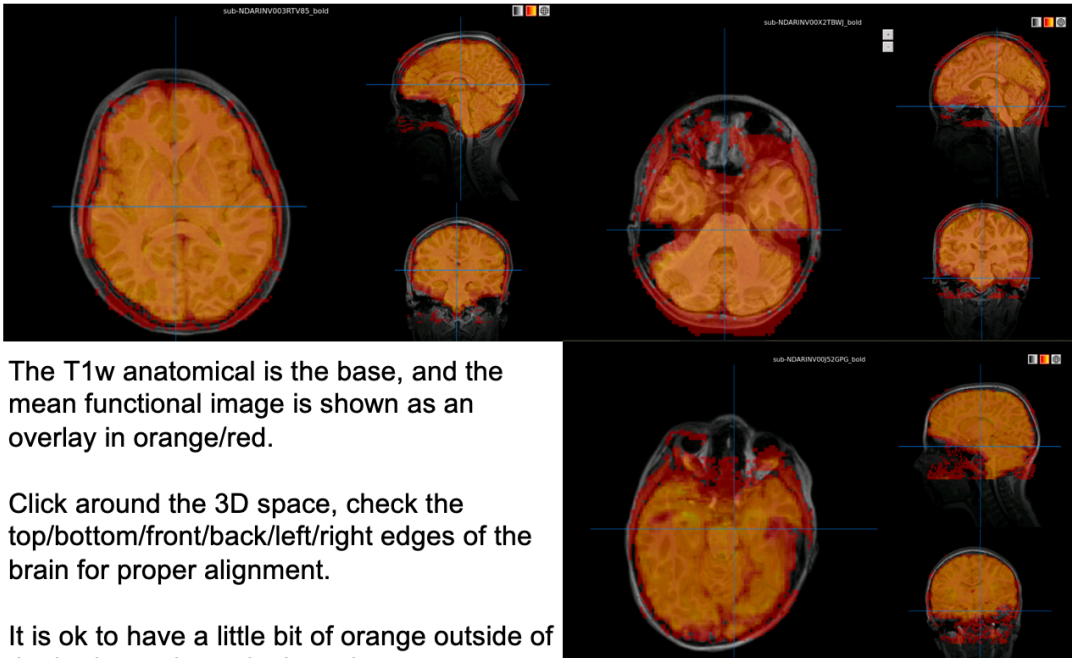
```
[ ]: firefox /tmp/uniqname_tmp/index.html
```

6. The first time you open Firefox, you'll need to edit a setting. In the address box type about:config and hit enter. Click "Accept Risks" button. In search box type security.file and double click on the value for security.fileuri.strict_origin_policy and change it to false. You should only have to do this once!
7. Follow the on-screen directions to start rating the images.

If you click this orange button, a drop-down menu will appear. In this menu you can adjust the transparency of orange functional overlay by sliding the "Transparency" bar. If needed, you can adjust the color scale, but you should NOT need to do this as the viewer will set it for you automatically. Unclick the same button to close the dropdown window.



Examples of Pass Images

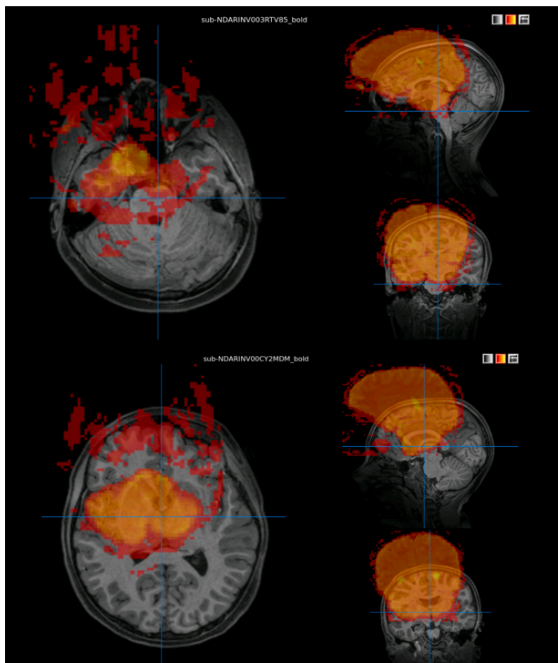


The T1w anatomical is the base, and the mean functional image is shown as an overlay in orange/red.

Click around the 3D space, check the top/bottom/front/back/left/right edges of the brain for proper alignment.

It is ok to have a little bit of orange outside of the brain as shown in these images.

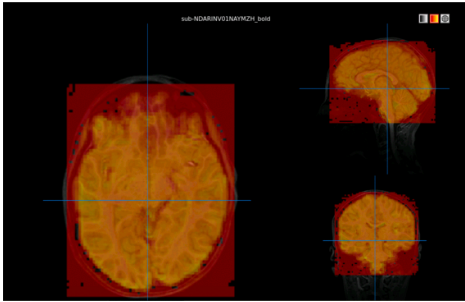
Examples of Fail Images



The mean functional image is clearly not aligned with the anatomical image. These are very obvious examples, there may be a case when the alignment is not correct AND not quite as obvious as this example.

Examples of Flag Images

Use this command sparingly! Try to remember that in this step we are **NOT** checking the quality of the data, we are only checking that the images are correctly aligned.



Technically this brain is correctly aligned with the anatomical, but there is so much signal outside of the brain across the entire image that it is difficult to see the anatomical.

8. When you are done with the session, verify that your csv file has saved BEFORE you close the browser window. When you are sure that the csv file is actually saved, close the browser and in that same terminal window run (replace unickname with your unickname):

```
[ ]: ./abcd_papaya_cleanup.sh /tmp/unickname_tmp
```

9. Move csv file(s) from Downloads to correct folder by typing:

```
[ ]: cp ~/Downloads/*CheckReg*.csv /data/projects/abcd_data/CheckReg/CSVs/
```

1.3 Part 1 CheckWarp Instructions:

1. Check the [google sheets CheckWarp file](#) to pick which session file you will QC. You cannot check any session more than once. We will have 3 different raters for each session file. Each QC session contains 100 images. Please do not start a session if you cannot get through 100 images. We estimate it will take up to 30 minutes to get through one session.
2. Open a remote desktop using X2Go (directions for how to connect are [here](#))
3. Open a new terminal window within the remote desktop, go into the correct directory by typing:

```
[ ]: cd /data/projects/abcd_data/Scripts/ABCD-Papaya/
```

4. Run the setup script by typing the command below in the terminal window. Replace CheckWarp_000 with whichever session you picked above in step 1. Replace unickname with your unickname. This will take about 1 minute to copy the data.

```
[ ]: ./abcd_papaya_checkwarp.sh ../../CheckWarp/subject_lists/CheckWarp_000 /tmp/  
↪ unickname_tmp
```

5. Then start the viewer (replace unickname with your unickname) by typing this in the terminal window:

```
[ ]: firefox /tmp/unique_name_tmp/index.html
```

6. The first time you open Firefox, you'll need to edit a setting. In the address box type `about:config` and hit enter. Click "Accept Risks" button. In search box type `security.file` and double click on the value for `security.fileuri.strict_origin_policy` and change it to `false`. You should only have to do this once!
7. Follow the on-screen directions to start rating the images.
8. When you are done with the session, verify that your csv file has saved BEFORE you close the browser window. When you are sure that the csv file is actually saved, close the browser and in that same terminal window run (replace `unique_name` with your `unique_name`):

```
[ ]: ./abcd_papaya_cleanup.sh /tmp/unique_name_tmp
```

9. Move csv file(s) from Downloads to correct folder by typing:

```
[ ]: cp ~/Downloads/*CheckWarp*.csv /data/projects/abcd_data/CheckWarp/CSVs/
```

1.4 All done!