**Subjects With Non-Standard Gradient Directions**

It is possible to process subjects with a non-standard number of images. This can happen if the data is acquired in a non-standard way or if the scan is not complete. As long as your data set includes 6 B1000s and 15 B2000s, you can use the method below to process the data via DKE.

**Note**: if you are processing a group of subjects and one subject returns an indexing error (typically “Index in position 4 exceeds array bounds”), this might be an indication that the subject has a non-standard number of images. To confirm this, you can look at the bval file or the 4D nifti and count the number of images.

Processing subjects with this issue requires two things:

* Modification to the DKE parameters file
* Manual gradient file creation

*Manual Gradient File Creation*

Normally, DKE only requires a single gradient file which is created during DKE\_basic.m or DKE\_with\_preproc.m. However, it is not possible to use this single gradient file when you have a non-standard number of images. You will most likely need two gradient files: one to house your B1000 information and one to house your B2000 information.

To manually create the gradients files, you will need to transpose the bvec file and save the B1000 values as a text file called “gradient\_dke.txt” and the B2000 values as a text file called “gradient\_dke.txt”.

You can determine which values correspond to which B value but using your bval file as a guide:

A picture containing text, electronics, scoreboard

Description automatically generated

We can see here that the first 64 items (after the B0) are B1000s, so the first 64 rows of the bvec file (after the B0 values) will correspond to the B1000 images, while the last 21 correspond to the B2000 images. This is also an easy way of figuring out how many of each B value you have, which is information you will need when you modify your DKE parameters file.

*DKE Parameters Modifications*

Open your dke\_parameters.txt file:

Text

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The lines of interest that need to be modified are lines 3, 20, 22, and 24.

* Line 3 needs to be the path to the folder with your 4d.nii and your gradient\_dke.txt files.
* Line 20 needs to include and array of your image counts. In the example above with 64 B1000s and 21 B2000s, this line would read ndir = [64 21]
* Line 22 needs to include a path to your gradient\_dke.txt files. This can be written as fn\_gradients = {‘/Path/to/gradient\_dke.txt’, ‘/Path/to/gradient\_dke2.txt’}
* Line 24 needs to specify the gradient range and it should read idx\_gradients = {1:ndir(1) 1:ndir(2)};