THEME 4 / LECTURE 5: ACROSS-VISIT CO-REGISTRATION OF T1 IMAGES
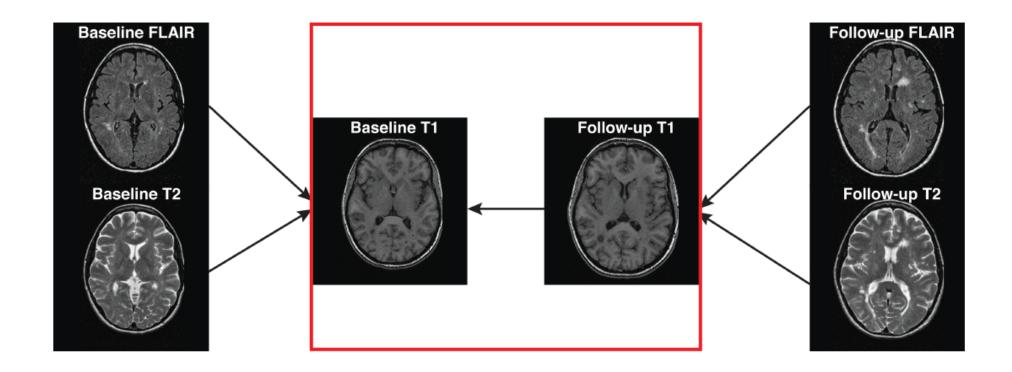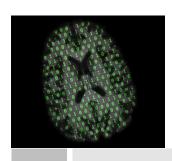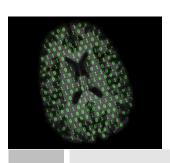
Across-Visit Co-Registration of T1 Images

Across-Visit Co-Registration of T1 Images

□ Visit 1 files are in the visit 1 T1 space and visit 2 files are in the visit 2 T1 space

□ We will register the follow-up/visit 2 T1 scan to the visit 1/baseline scan

□ Next slide:
  □ take the skull-stripped T1 from visit 2, register it to the skull-stripped T1 from visit 1
  □ use this transformation to put the skull-stripped T2 and skull-stripped FLAIR from visit 2 into the T1 space from visit 1
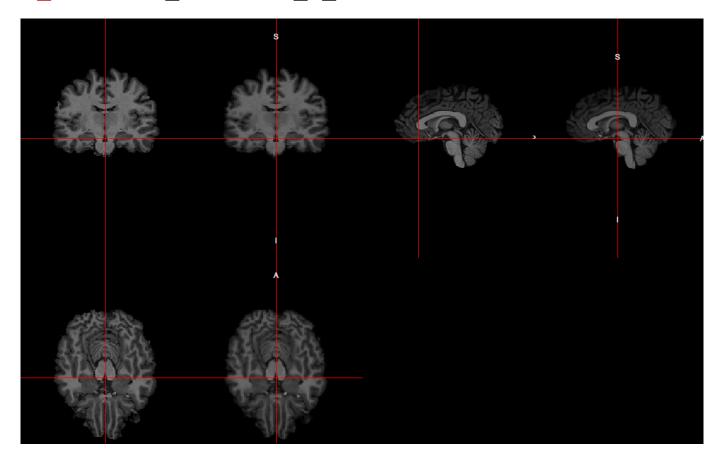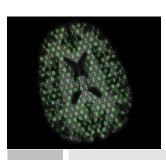
Across-Visit Co-Registration Skull-Off Images

```r
visit2_files = file.path(mridir2,
                c("113-02-MPRAGE_processed.nii.gz",
                  "113-02-T2w_processed.nii.gz",
                  "113-02-FLAIR_processed.nii.gz"))
outfiles2 = sub(".nii.gz", "_reg.nii.gz", visit2_files)

ants_regwrite(filename = masked_imgs2[[1]],
              retimg = FALSE, outfile = outfiles2[1],
              template.file = masked_imgs[[1]],
              other.files = masked_imgs2[2:3],
              other.outfiles = outfiles2[2:3],
              typeofTransform = "Rigid", verbose = FALSE)
```
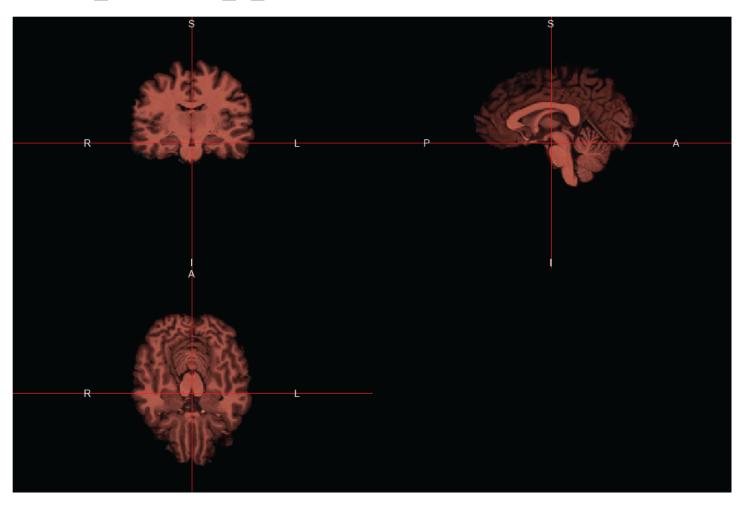
Plotting Registered T1 Images Side-By-Side

```
ss_t1=masked_imgs[[1]]
visit_2_t1=readNIfTI(outfiles2[1],reorient=FALSE)
double_ortho(ss_t1,visit_2_t1)
```
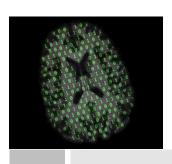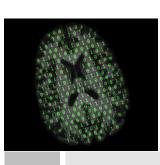
Plotting Registered T1 Image Overlay

```
ortho2(ss_t1,visit_2_t1,col.y=alpha(hotmetal(),0.25))
```
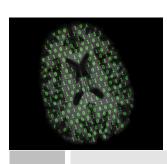
Across-Visit Co-Registration Skull-On Images

```r
visit2_files_skull = file.path(mridir2,
                    c("113-02-MPRAGE_processed.nii.gz",
                    "113-02-T2w_processed.nii.gz",
                    "113-02-FLAIR_processed.nii.gz"))
outfiles2_skull = sub(".nii.gz", "_reg.nii.gz",
visit2_files_skull)

ants_regwrite(filename = visit2_files_skull[[1]],
              retimg = FALSE, outfile = outfiles2_skull[1],
              template.file = outfiles[[1]],
              other.files = visit2_files_skull[2:3],
              other.outfiles = outfiles2_skull[2:3],
              typeofTransform = "Rigid", verbose = FALSE)
```

T1 Skull-On Images Side-By-Side
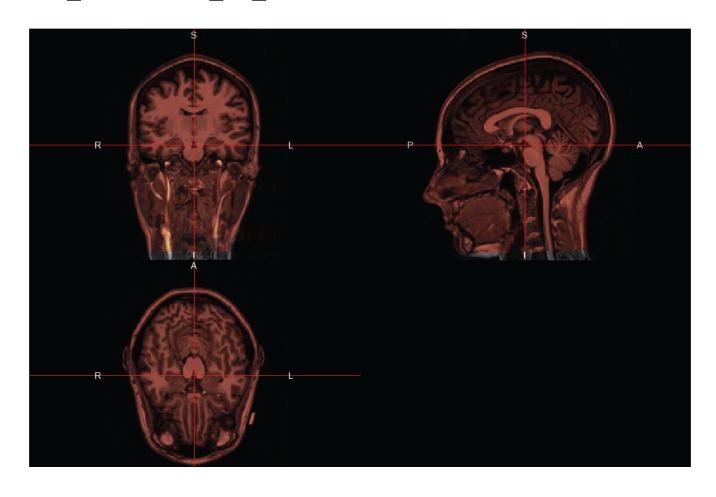
```
t1_skull=readNIfTI(outfiles[1],reorient=FALSE)
v2_t1_skull=readNIfTI(outfiles2_skull[1],reorient=FALSE)
double_ortho(t1_skull, v2_t1_skull)
```
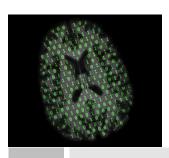
T1 Skull-On Images, Overlay

```
ortho2(t1_skull, v2_t1_skull,col.y=alpha(hotmetal(),0.25))
```

Overview

- Registration within a subject can be done in R
  - `ants_regwrite` wraps around the reading/writing of images and applying transformations
  - `double_ortho` and `ortho2` can provide some basic visual checks to assess registration quality

- Once images are registered in the same space, operations can be applied to all the images:
  - Masking with a brain mask
  - Transforming images to new spaces with one modality