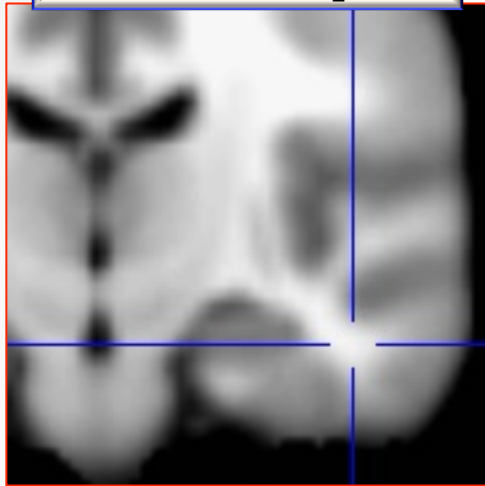


More Complex Mapping

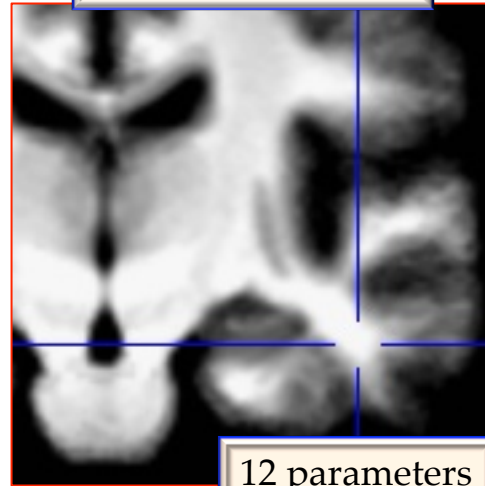
- Coming soon to an **AFNI** program near you: Nonlinear Warping
- $I_{\text{new}}(\mathbf{x}) = I_{\text{old}}(\mathbf{W}(\mathbf{x}))$
 - where $\mathbf{W}(\mathbf{x})$ depends on a *lot* of parameters (1000-50000+)
 - Method: Incremental transformation with Hermite cubic polynomials over finer and finer 3D patches
- ★ Better alignment of anatomical volumes to template space
 - Then carry the functional results to template space for better group analyses?
 - As an aid to brain segmentation and atlas-ing accuracy?
- ★ Pre- and post-surgical alignment?
- Status of software:
 - Done: *3dQwarp* program brings 2 volumes into alignment
 - TBD: Integrate it into scripts to make it actually useful

Example: Brain Averages

MNI 152 template



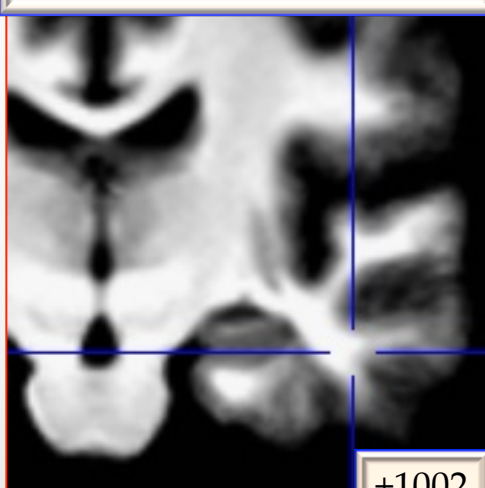
Linear = Affine



12 parameters

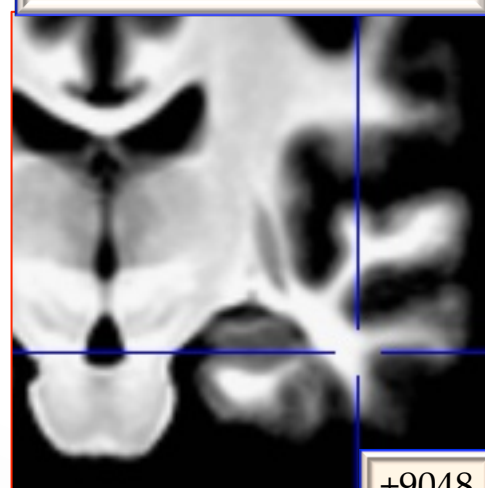
Averages of 21
3 Tesla brain volumes
with varied
levels of refinement in
the nonlinear warping
(smaller patch=more refinement)

Nonlinear: Patch=101



+1002

Nonlinear: Patch=49



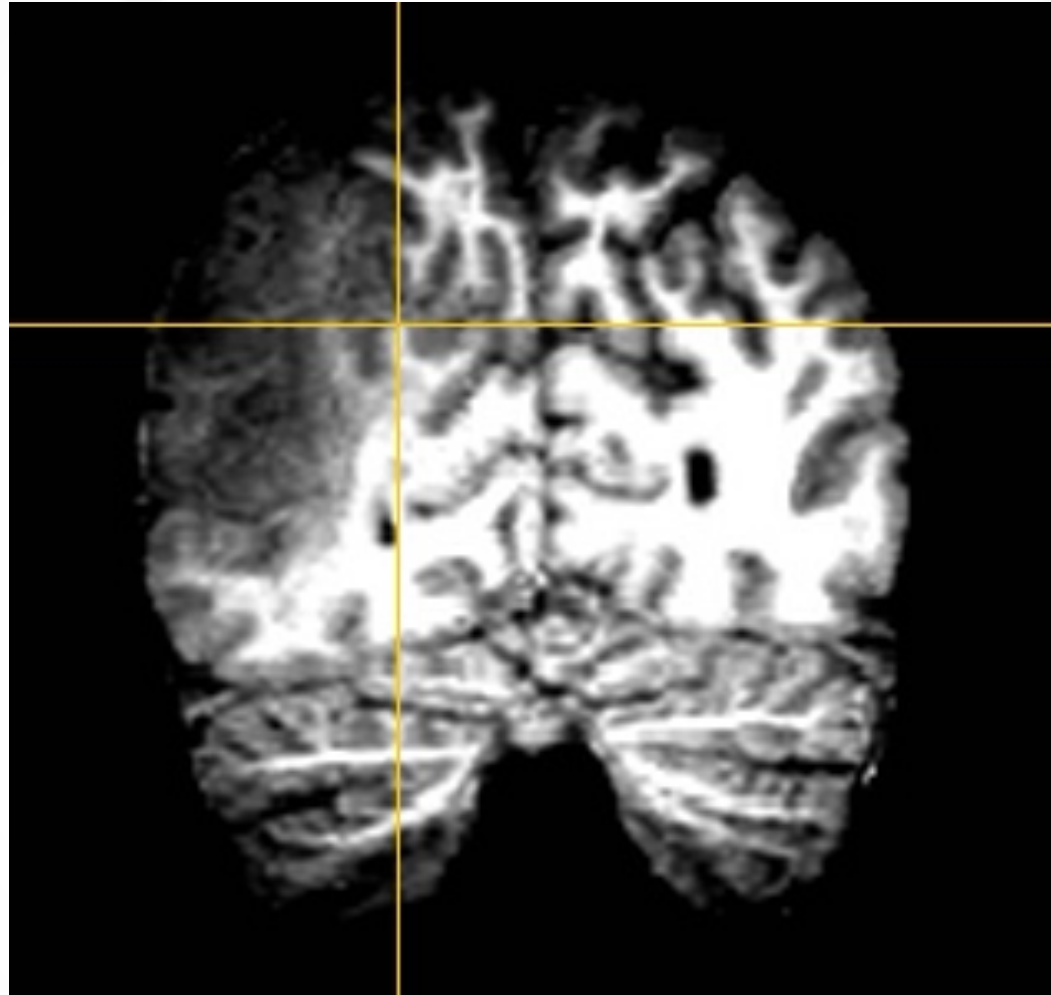
+9048

Nonlinear: Patch=23



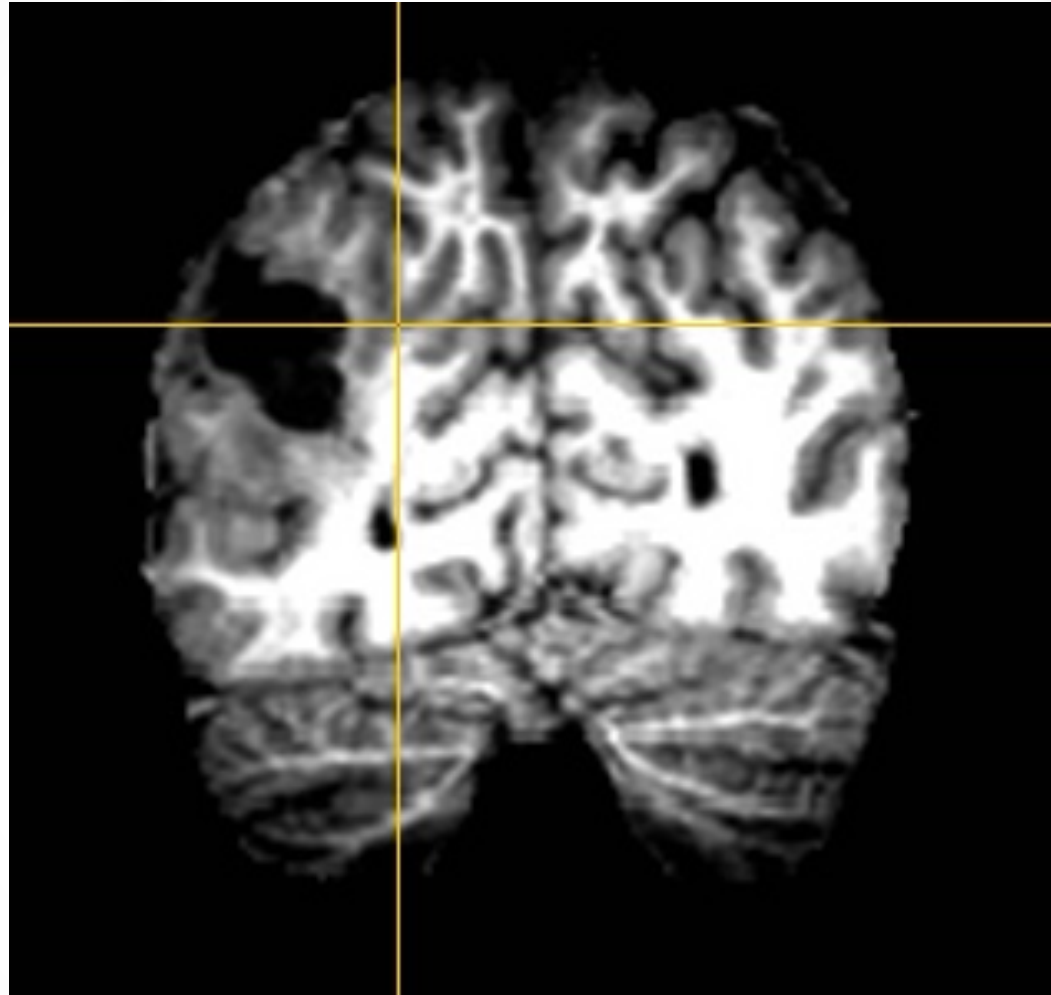
+70008

Example: Neurosurgery



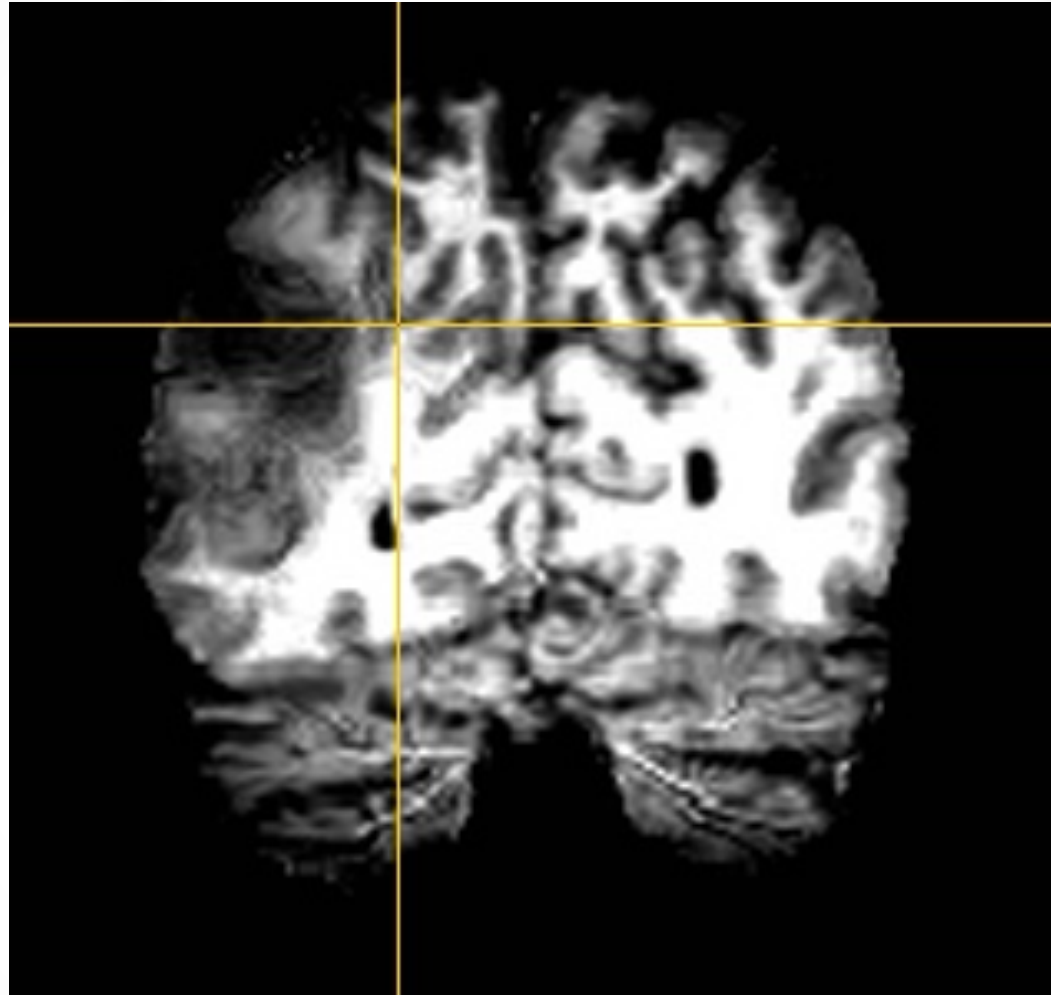
Pre-surgical volume

Example: Neurosurgery



Post-surgical volume

Example: Neurosurgery

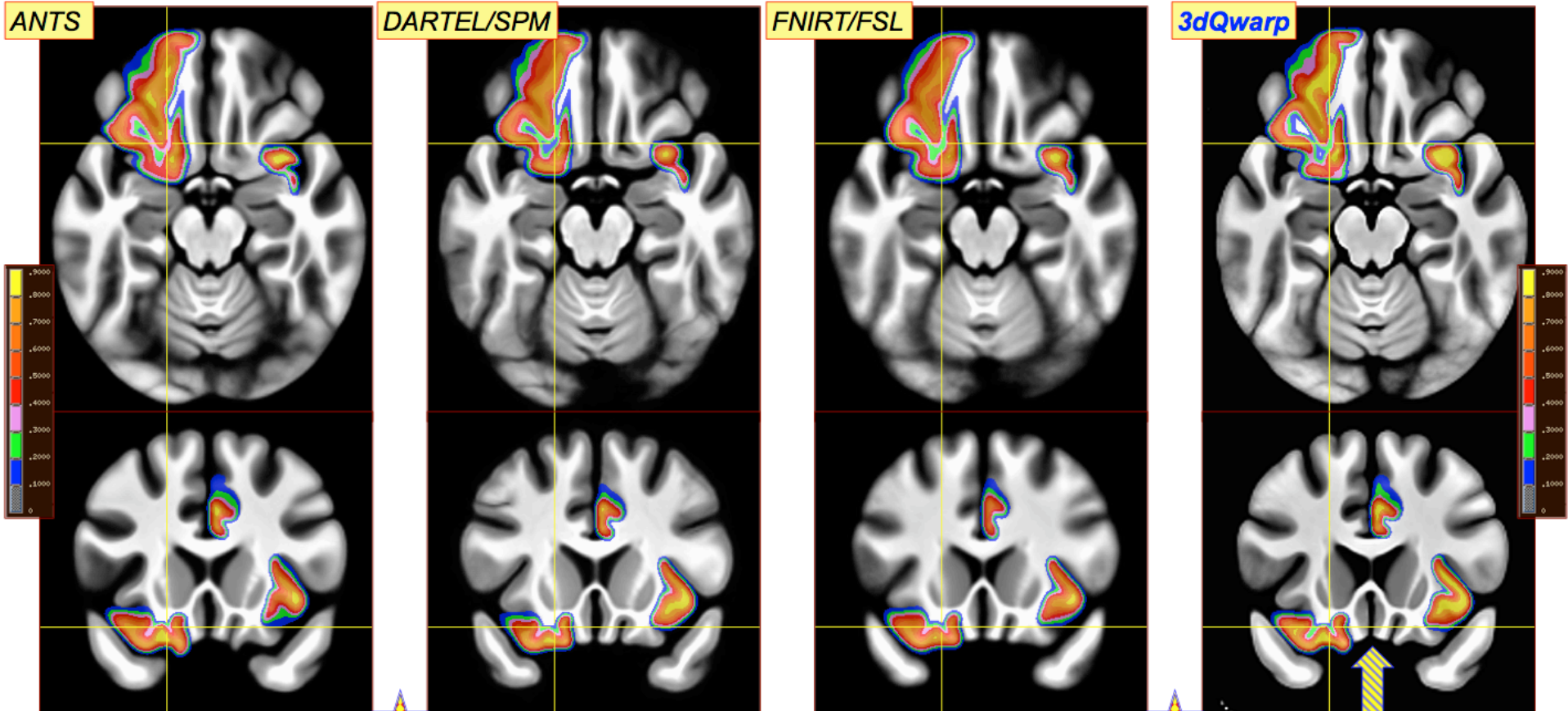


Pre-surgical volume
3dQwarp-aligned to Post-surgical volume

Example: Atlas Creation

Align MindBoggle 101 T₁ Datasets to Separate Template:
Overlap Probability Maps for 3 of the Labeled Regions

LH: lateral orbital frontal
RH: caudal anterior cingulate
RH: insula



ANTS & DARTEL & FNIRT
run with default settings

3dQwarp distribution of overlap probabilities is 2nd order
stochastically dominant in a majority of 62 labeled regions

More yellow in the overlay means
more 90+% overlap in labels