Why *de*-face when you can *re*-face?
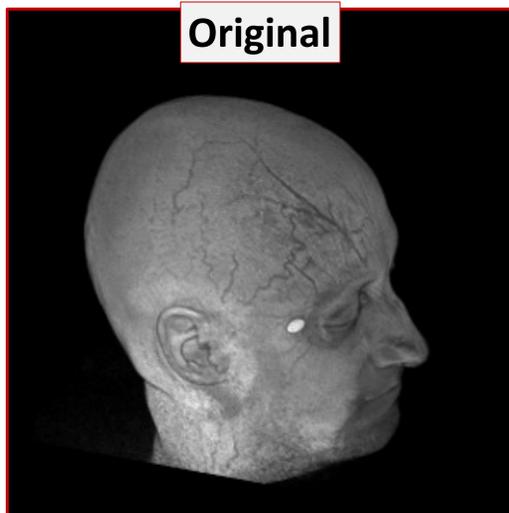## RW Cox and PA Taylor
AFNI Group – NIMH / NIH / Bethesda MD USA
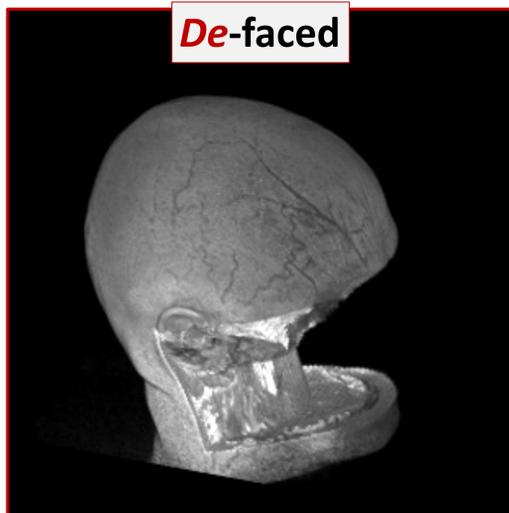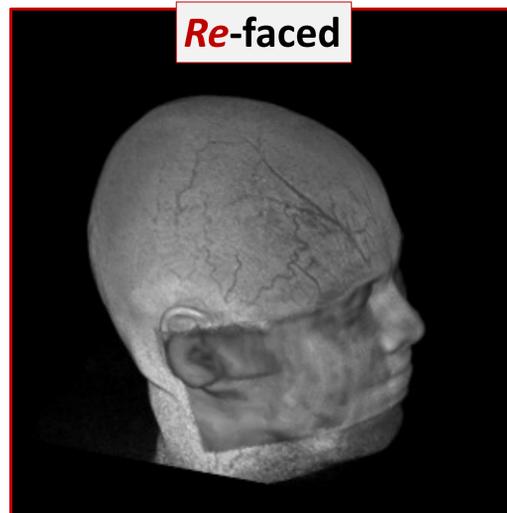https://afni.nimh.nih.gov/

Original

- Extremely distinguished looking gentleman.

De-faced

- Chopped up.
- Utilitarian.
- Ugly.
- Perhaps confusing to some 3D algorithms?

Re-faced

- A minimal "face" region has been replaced.
- Identification difficult, but perhaps from shape of skull, etc?

Re-faced Plus

- Most of the exterior of the head has been replaced.
- Can't identify person via skull or other features.
- Un-ugly.

SIMON data (session 15):
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6823440/

Very Short Video:
https://www.youtube.com/watch?v=UoOILwdH52U

How It Works

Template Construction [@afni_refacer_make_master]
- Take a bunch of T1w volumes (skull-on)
  - Uniform-ize intensity of each [3dUnifize]
- Affine align each to **MNI template** (skull-on) [3dAllineate]
  - Compute median across volumes at each voxel
- Start with MNI template brain-only mask
  - Dilate it, extend downward to include brain stem, etc
- Zero out brain region of median volume [3dcalc]
  - Mark exterior of median volume with negative values
- *et voilà* – the **refacing template***!*

Template

Method [@afni_refacer_run]
- Uniform-ize intensity of new T1w volume (skull-on)
- Affine align to **MNI template** (skull-on)
- Back transform **refacing template** to original space
- Find scale factor from template's values to approximately match original volume's intensities
- Replace voxels in original volume with rescaled remapped template voxels, where template is positive
  - Replace voxels in original volume with zero, where template is negative (head's exterior)
  - Remove *isolas* = tiny islands of nonzero voxels