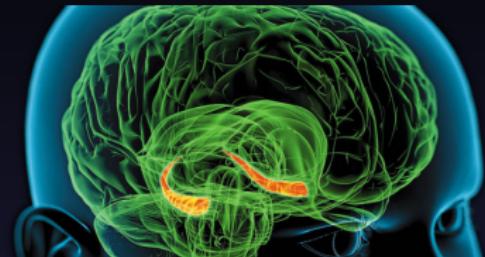


Big \times (Science + Data) @ UVA Imaging

Nick Tustison, DSc

Hippocampal growth in London taxi drivers



Hippocampal growth in London taxi drivers



SPM(1995) : 6418 citations

VBM(2000) : 3593 citations

Opt. VBM(2001) : 2353 citations

TBSS(2006) : 1106 citations

$$6418 + 3593 + 2353 + 1106 = 13470 \text{ citations}$$

TBI in breachers—*neuroimaging correlates?*



TBI in breachers—*neuroimaging correlates?*

Investigate white matter injury

controls/students/instructors



TBI in breachers—*neuroimaging correlates?*

A photograph of a large, intense fireball or explosion at a breaching site. In the foreground, several soldiers in camouflage uniforms and gear are crouching behind a wooden wall, looking towards the blast. The background shows more wooden structures and trees.

Investigate white matter injury

controls/students/instructors

*Logical circularity in
SPM, VBM, & TBSS*

“ Maximum efficiency with
minimum *wasted* effort.
Jigaro Kano ”



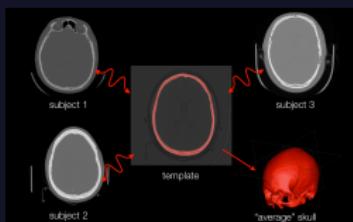
“ Maximum efficiency with
minimum wasted effort.
Jigaro Kano ”



*There are **life-altering** and **free** UVA
resources that you are probably not using!*

Misc. neuroimaging projects

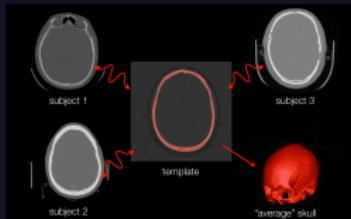
Skull Thickness



Surrogate CT Skull Thickness
Measurements with MRI

Misc. neuroimaging projects

Skull Thickness



Surrogate CT Skull Thickness Measurements with MRI

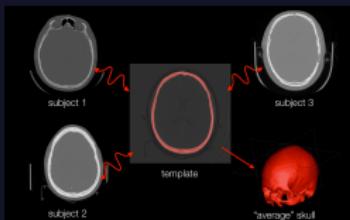
Essential Tremor



Longitudinal FA correlations following surgical treatment for ET

Misc. neuroimaging projects

Skull Thickness



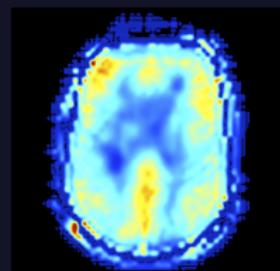
Surrogate CT Skull Thickness Measurements with MRI

Essential Tremor



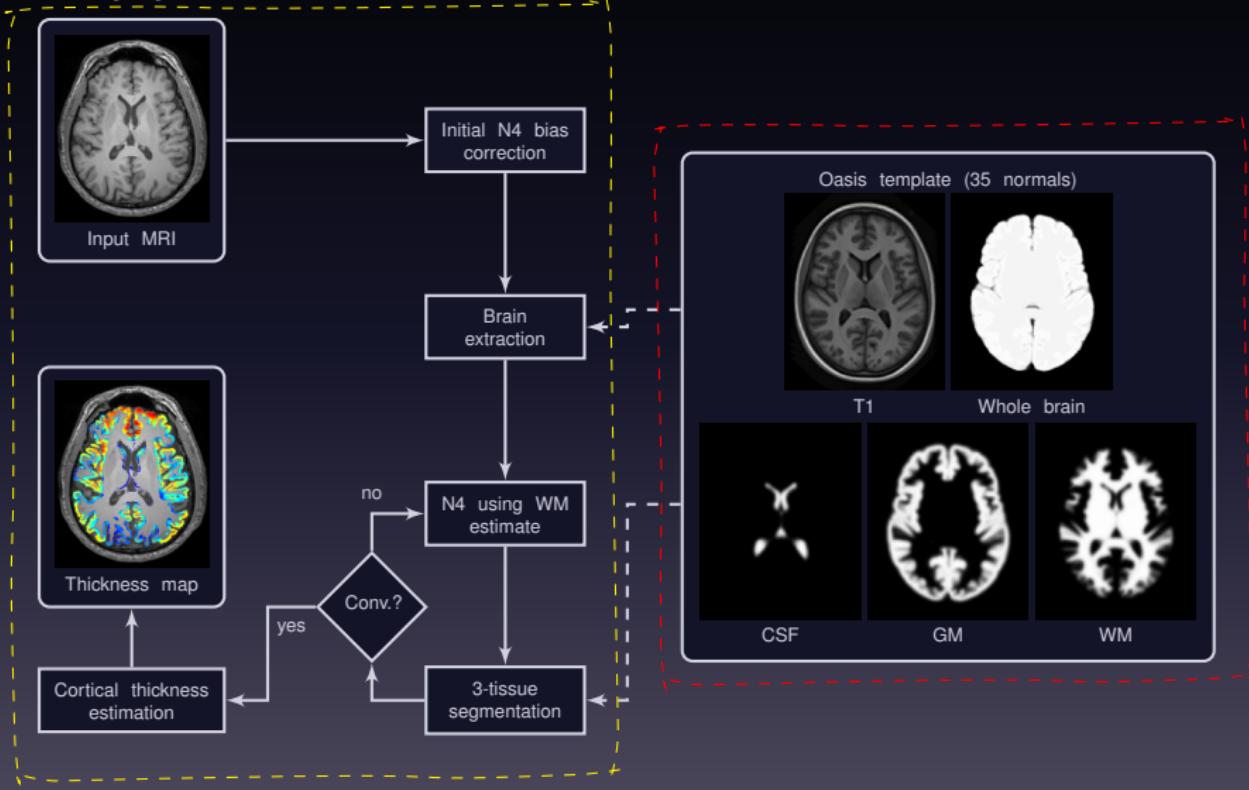
Longitudinal FA correlations following surgical treatment for ET

ASL → CBF

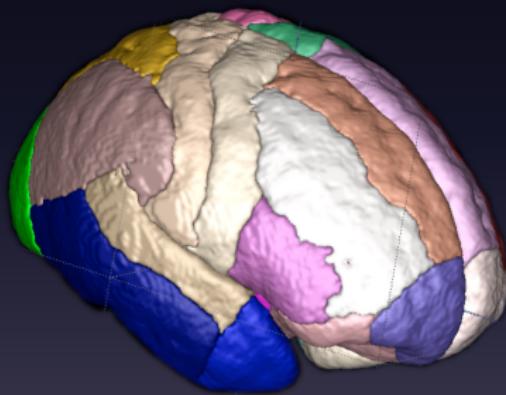


Automatic generation of clinical CBF maps from ASL

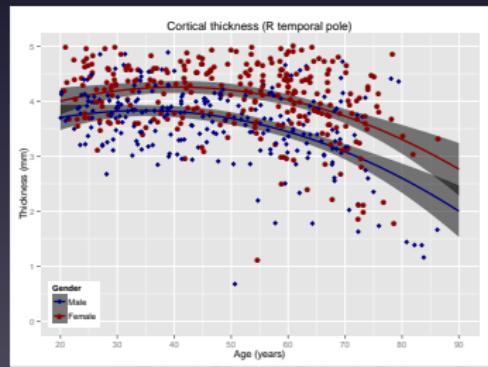
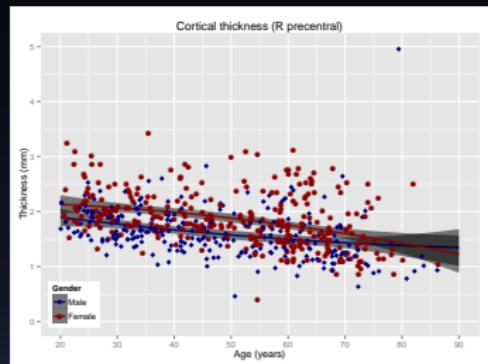
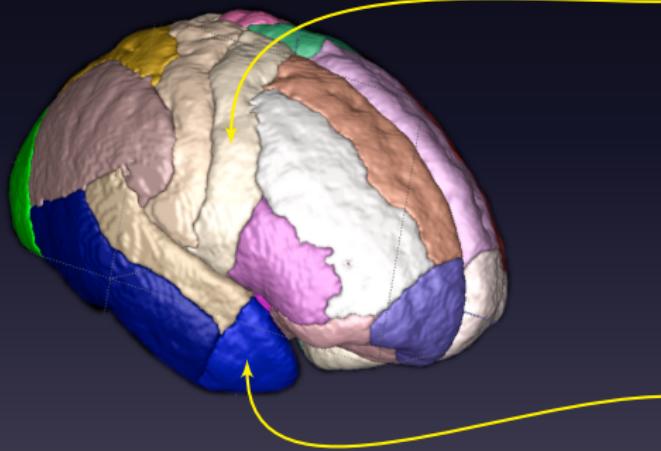
ANTs pipeline for cortical thickness estimation



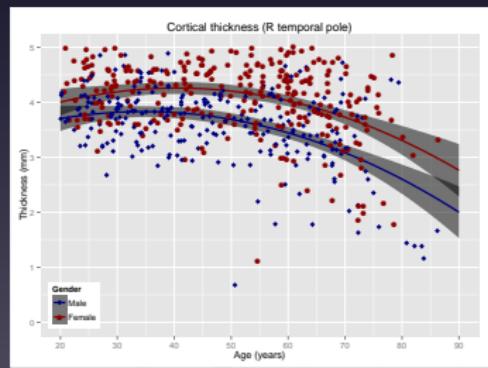
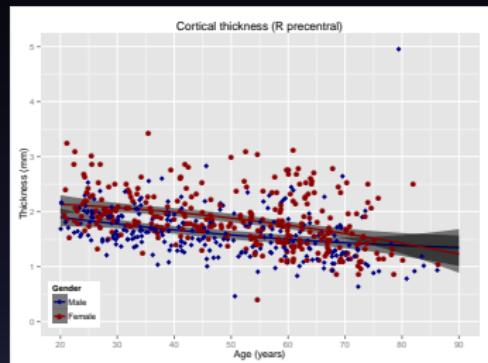
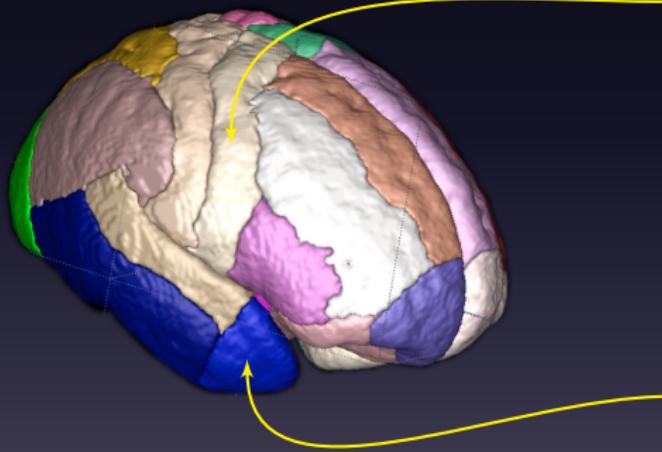
$\text{thickness} \sim 1 + \text{age} + I(\text{age}^2)$



$$\text{thickness} \sim 1 + \text{age} + I(\text{age}^2)$$



$$\text{thickness} \sim 1 + \text{age} + I(\text{age}^2)$$



It takes $\sim 20\text{--}30$ hours per subject!!

Big data → open source software



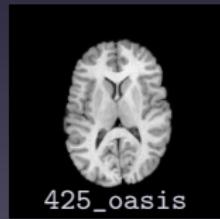
Big data → open source software



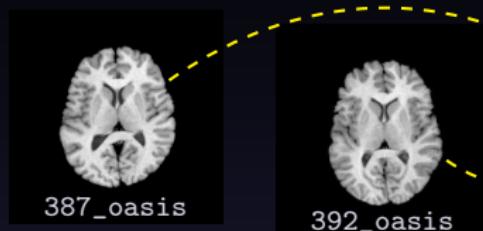
Big data → open source software



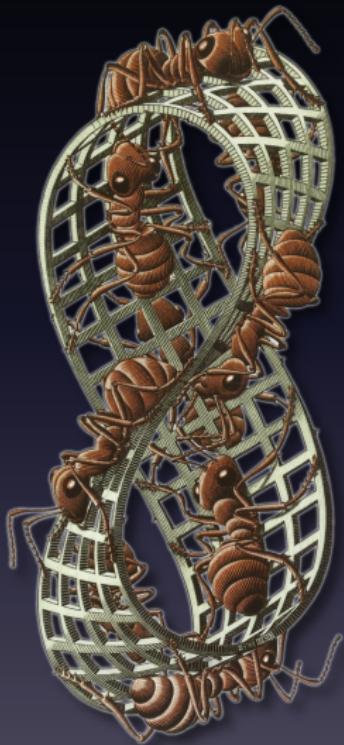
UVACSE/computational cluster



UVACSE/computational cluster



| ssh | ssh | Atropos | bash | bash |
|------------------------|--------------------|---------|------|--------------------|
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| 237152.llc5.itc. njt4n | nodeprep 389_oasis | 18027 | 1 | 10gb 30:00 R 11:36 |
| 237153.llc5.itc. njt4n | nodeprep 390_oasis | 4281 | 1 | 10gb 30:00 R 11:11 |
| 237154.llc5.itc. njt4n | nodeprep 391_oasis | 13307 | 1 | 10gb 30:00 R 10:46 |
| 237155.llc5.itc. njt4n | nodeprep 392_oasis | 12401 | 1 | 10gb 30:00 R 10:03 |
| 237156.llc5.itc. njt4n | nodeprep 393_oasis | 14652 | 1 | 10gb 30:00 R 09:58 |
| 237157.llc5.itc. njt4n | nodeprep 394_oasis | 14206 | 1 | 10gb 30:00 R 09:05 |
| 237158.llc5.itc. njt4n | nodeprep 395_oasis | 7167 | 1 | 10gb 30:00 R 09:00 |
| 237159.llc5.itc. njt4n | nodeprep 396_oasis | 14530 | 1 | 10gb 30:00 R 08:38 |
| 237160.llc5.itc. njt4n | nodeprep 397_oasis | 5780 | 1 | 10gb 30:00 R 08:16 |
| 237161.llc5.itc. njt4n | nodeprep 398_oasis | 6252 | 1 | 10gb 30:00 R 07:39 |
| 237162.llc5.itc. njt4n | nodeprep 399_oasis | 14795 | 1 | 10gb 30:00 R 07:22 |
| 237163.llc5.itc. njt4n | nodeprep 400_oasis | 17868 | 1 | 10gb 30:00 R 07:11 |
| 237164.llc5.itc. njt4n | nodeprep 401_oasis | 6386 | 1 | 10gb 30:00 R 06:27 |
| 237165.llc5.itc. njt4n | nodeprep 402_oasis | 23673 | 1 | 10gb 30:00 R 06:25 |
| 237166.llc5.itc. njt4n | nodeprep 403_oasis | 6298 | 1 | 10gb 30:00 R 06:25 |
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| 237168.llc5.itc. njt4n | nodeprep 405_oasis | 6513 | 1 | 10gb 30:00 R 06:13 |
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| 237170.llc5.itc. njt4n | nodeprep 407_oasis | 7948 | 1 | 10gb 30:00 R 05:18 |
| 237171.llc5.itc. njt4n | nodeprep 408_oasis | 15888 | 1 | 10gb 30:00 R 05:11 |
| 237172.llc5.itc. njt4n | nodeprep 409_oasis | 12921 | 1 | 10gb 30:00 R 05:01 |
| 237173.llc5.itc. njt4n | nodeprep 410_oasis | 13087 | 1 | 10gb 30:00 R 04:54 |
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| 237175.llc5.itc. njt4n | nodeprep 412_oasis | 16127 | 1 | 10gb 30:00 R 04:44 |
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| 237183.llc5.itc. njt4n | nodeprep 420_oasis | 13805 | 1 | 10gb 30:00 R 01:30 |
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| 237190.llc5.itc. njt4n | nodeprep 427_oasis | 13495 | 1 | 10gb 30:00 R 00:11 |
| 237191.llc5.itc. njt4n | nodeprep 428_oasis | -- | 1 | 10gb 30:00 Q -- |
| 237192.llc5.itc. njt4n | nodeprep 429_oasis | -- | 1 | 10gb 30:00 Q -- |
| 237193.llc5.itc. njt4n | nodeprep 430_oasis | -- | 1 | 10gb 30:00 Q -- |
| 237194.llc5.itc. njt4n | nodeprep 431_oasis | -- | 1 | 10gb 30:00 Q -- |
| 237195.llc5.itc. njt4n | nodeprep 432_oasis | -- | 1 | 10gb 30:00 Q -- |



Further information

- <http://www.itk.org>
- <http://www.picsl.upenn.edu/ANTS>
- <http://www.uvacse.virginia.edu>