NEUROLAW:

A PRIMER FOR PSYCHIATRISTS

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NEUROLAW: HELP OR HINDRANCE IN THE LEGAL PROCESS?

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The Perennial Question: How We Think About How We Think

- Free Will?
  - Law
  - Volition, control, choice
    - Actions determined by the brain itself rather than by its deliberation (Libet et al. 1983)
- Determinism?
  - Neuroscience
  - The Brain-Over-Claim Syndrome
    - Neuroimaging not sufficient for neurobiological causality. Urbaniok (2006, 2012). Morse (2007)

Neural Imaging in Free Will vs Determinism

- Dynamic pattern of neural activity recorded using magnetoencephalography (MEG)
- Prediction of behavior (fMRI)
- Task: Forced and chosen behavior
- Analysis: Single-trial analysis
- Neural correlates: Occipital, parietal and temporal
- No contribution from frontal areas

Brain Dysfunction
Is Crime a Clinical Disorder?

Offense	%
Homicide	94
Habitual aggression	61
Juvenile offenders	76

Application of Neuroimaging

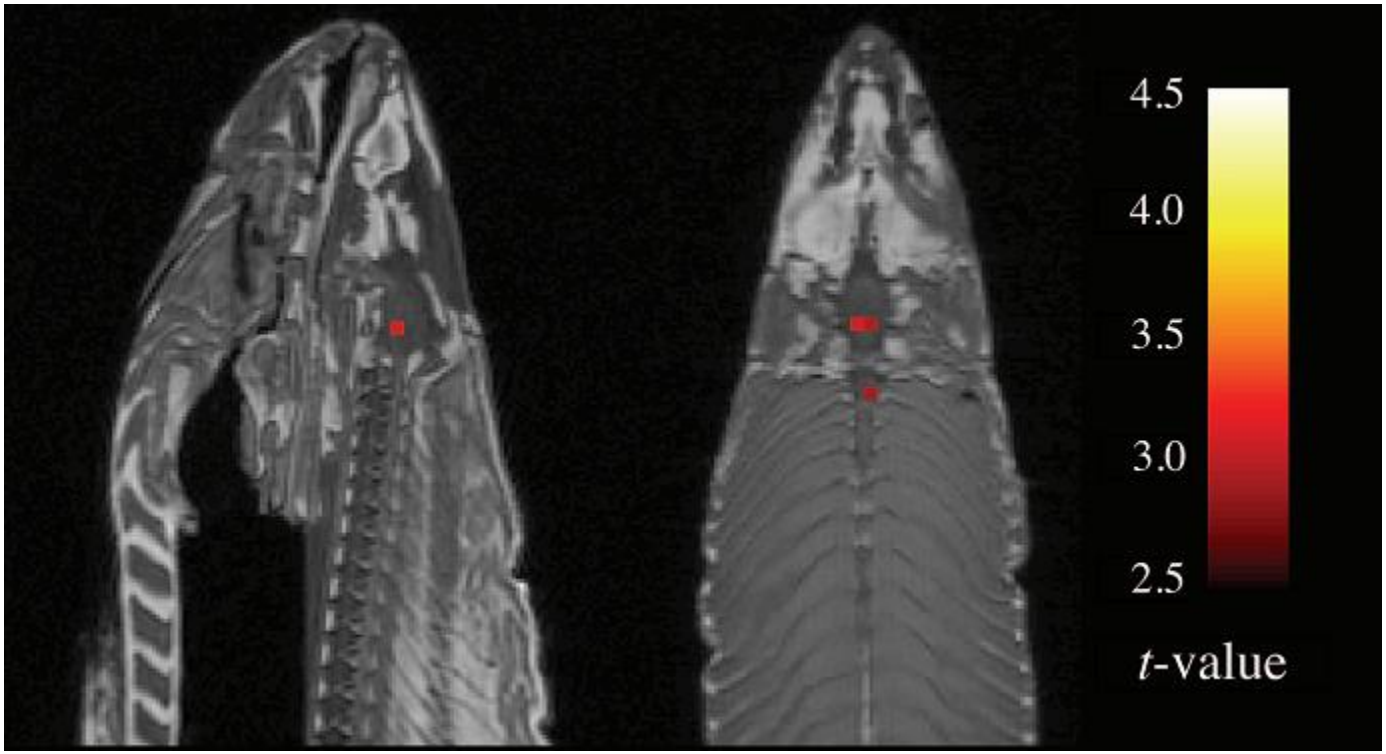
- Free will
- Causation as excuse
- Causation as compulsion
- Prediction as excuse
- Dualism
- Non-efficacy of mental states

Neuroimaging Technologies: Brain Fingerprinting

- STRUCTRAL- MRI, DTI
- FUNCTIONAL- Functional MRI (fMRI), SPECT, PET

DISADVANTAGES

- Not standardized
- Easily manipulated
- Apparent lack of falsifiability
- May dazzle and seduce jurors and the "CSI effect"
- Effect of medications not always short-lived
- Undue deference to expert testimony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The Dead Salmon Study

- Functional neuroimaging of dead Atlantic salmon
- Fun trial on making correlations in fMRI
- IgNobel Prize in Neuroscience, 2012
- Multiple comparisons: Corrected Vs Uncorrected

Evidentiary Dilemma

- Brain scans: window into the workings of the mind
  - Cannot identify thoughts or ascribe motives
- Little evidence with sensitivity, specificity and reproducibility for any specific psychiatric disorder for forensic use
- Impossible to image the intent at the time of the act or brain state along with the relevant environmental and emotional factors

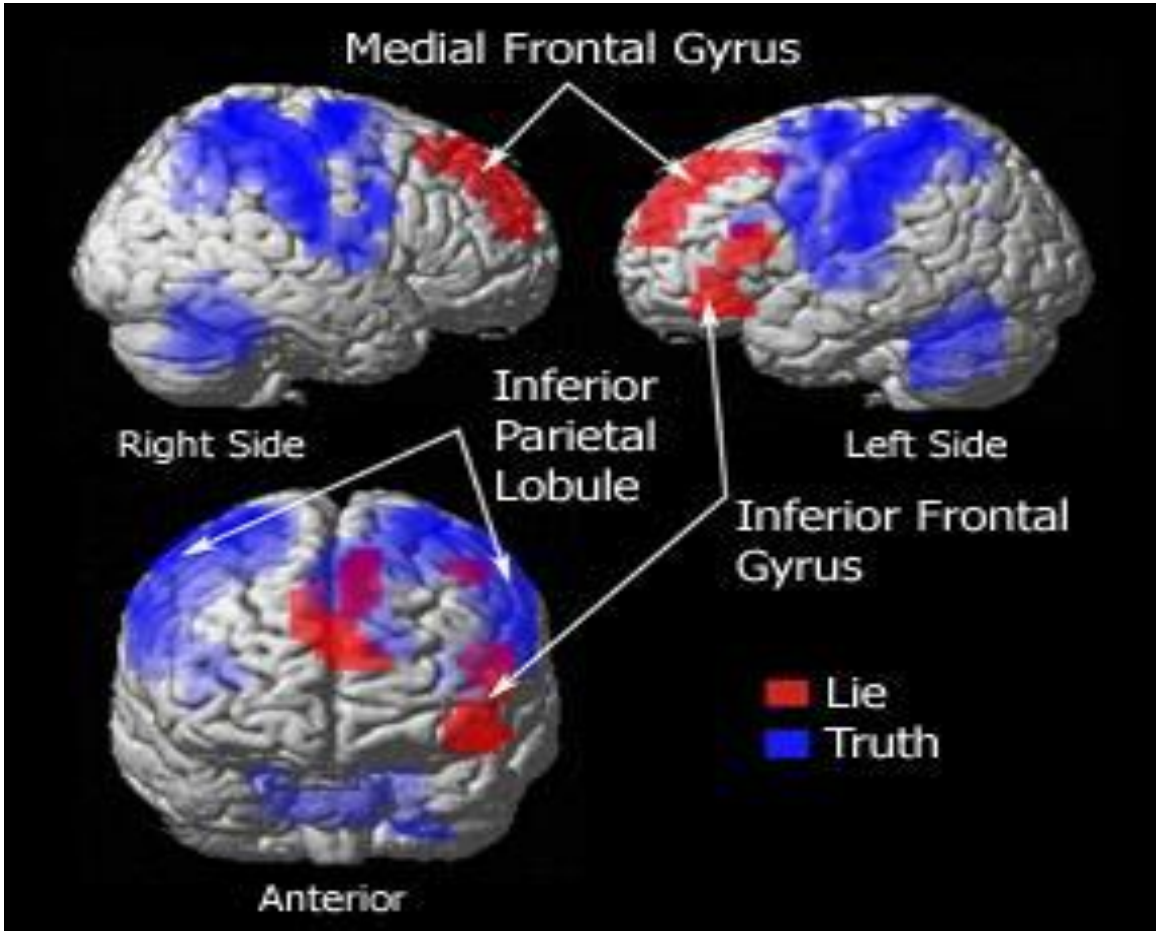
Can You Fool The Trier of fact?

- Juries tend to accept even "bad" explanations of behavior if couched in neuroscientific terms or evidence (see Weisberg et al., 2008)
- Leap-frogging: use of neuroscience in the courtroom before sufficient experience and testing in the clinical arena
- The technologies are not intended or adequately tested for forensic use
- Could be used as mitigating OR aggravating factor

Forensic Twists and Tangles

- Ake v. Oklahoma: cover the new technologies?
- Can the State force neuroimaging on an unwilling defendant?
- Can lawyers adequately cross-examine the EW who relies on the neuroimaging?
- When is a defendant incompetent to consent to the new technologies?

A Better Lie Detector?


Medial Frontal Gyrus
Right Side
Left Side
Inferior
Parietal
Lobule
Inferior Frontal
Gyrus
Lie
Truth
Anterior

At present, the sensitivity and specificity of fMRI-based lie detection is unknown. Analysis of the published literature reveals no data that provides unambiguous evidence regarding the sensitivity and specificity of fMRI-based neuroscience methods in the detection of lies at the individual-subject or the individual-event levels.

A Judge's Guide to Neuroscience, 2010

Lie Detection (fMRI) and Case Law

- Wilson v. Corestaff Services, L.P.
  - NY state
  - Failed Frye test
- U.S. v. Semrau
  - Failed Daubert
  - Failed FRE 403 (probative and relevant)
  - Failed FRE 702

The Psychopathic Brain

- Can we extrapolate from a brain scan to violent or criminal behavior?
- ROIs and imaging
  - Prefrontal cortex
  - Superior temporal gyrus
  - Amygdala-hippocampal complex
  - Anterior cingulate cortex
- "My genes made me do it!"
- Tennessee: State v. Waldroup (2010)
  - MAO-A variant and violence

Prefrontal Cortex

- Motzkin et al. 2011 showed diminished vmPFC connectivity in psychopaths.
- Structural imagining with DTI showed reduced connection between vmPFC and amygdala.
- Functional imaging with fMRI showed reduced connectivity between vmPFC and medial parietal cortex.

Presumptive Neural Basis of Sociopathy

- Impulsivity
- Irresponsibility
- Poor decision making
- Deficient emotional information processing
- Inability to follow social norms
- Deficiency in moral judgment
- Failure to avoid punishment

Does a change in brain, change a person ?

- Charles Whitman- Austin shooting
- Parkinsonian gamblers
- Fronto-Temporal Dementia and disinhibition
- Coprolalia in Tourette Syndrome
- Homicidal Somnambulism-Parks case (1992)
- Pedophile- case report (Burns & Swerdlow, Annals of Neurology, 2003)

The Future of Neuroscience and Law

- Improved diagnostic specificity
  - Assessment of cognition, emotion and behavior
  - Detect pain, event recall, lie detection
- More specific treatments for mental disorders
  - Targeted therapies
  - Predict recidivism (quasi-civil commitment)
- Alter common sense views of human nature
  - Affect public policy: 5th and 14th Amendment rights?
  - Affect legislative efforts: privacy law?
  - Affect legal practice

Useful References

- S.J. Morse and A.L. Roskies, eds.

  A Primer on Criminal Law and Neuroscience

  Oxford Univ. Press, 2013

- **Reference Manual on Scientific Evidence, 3rd ed.**

  National Research Council of the National Academy of Sciences, 2011

  Reference Guide on Neuroscience

  Reference Guide on Mental Health Evidence