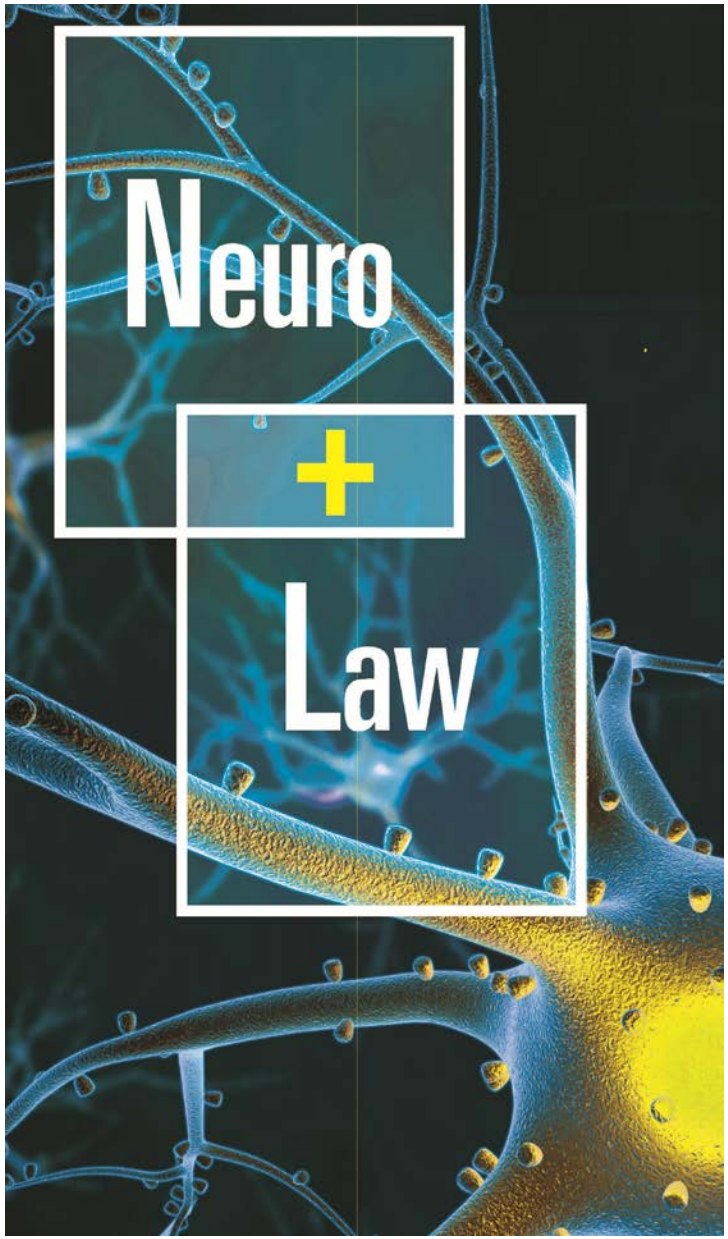

Neuroscience and the Rules of Evidence

Dr. Francis X. Shen, JD, PhD
:: University of Minnesota Law School
:: Petrie-Flom Center, Harvard Law School
:: Harvard MGH Center for Law, Brain & Behavior
:: MacArthur Foundation Research Network on Law & Neuroscience

National Academies of Sciences

Washington, DC
March 6, 2018

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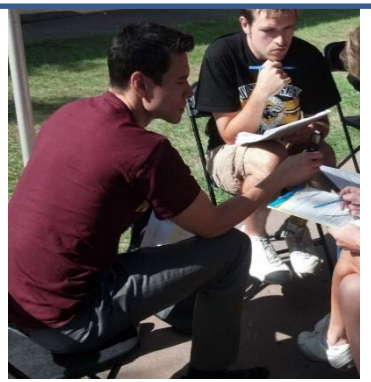
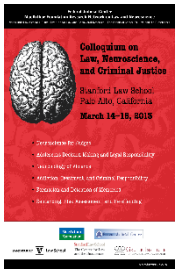
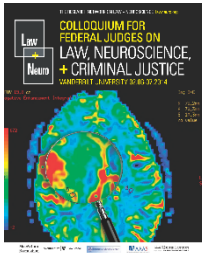
What do we do?





Empirical Neurolaw Research



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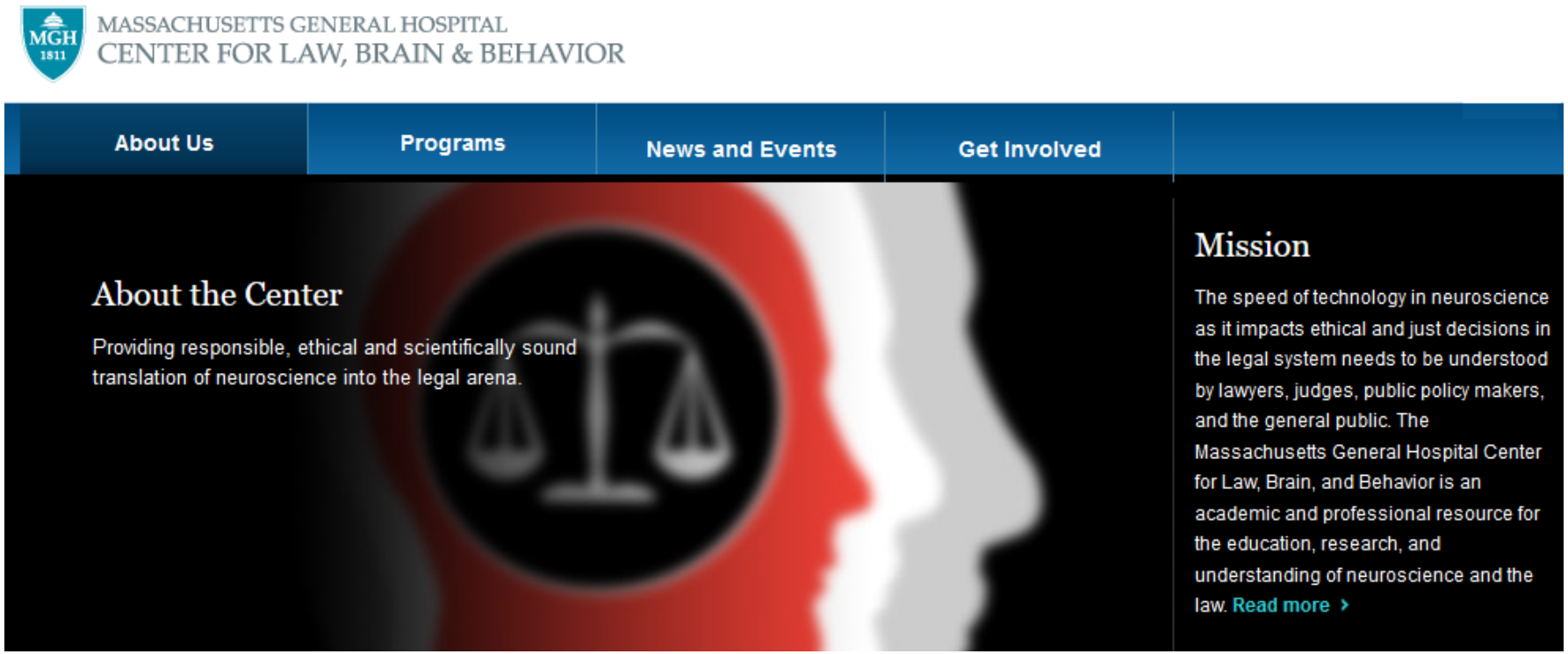

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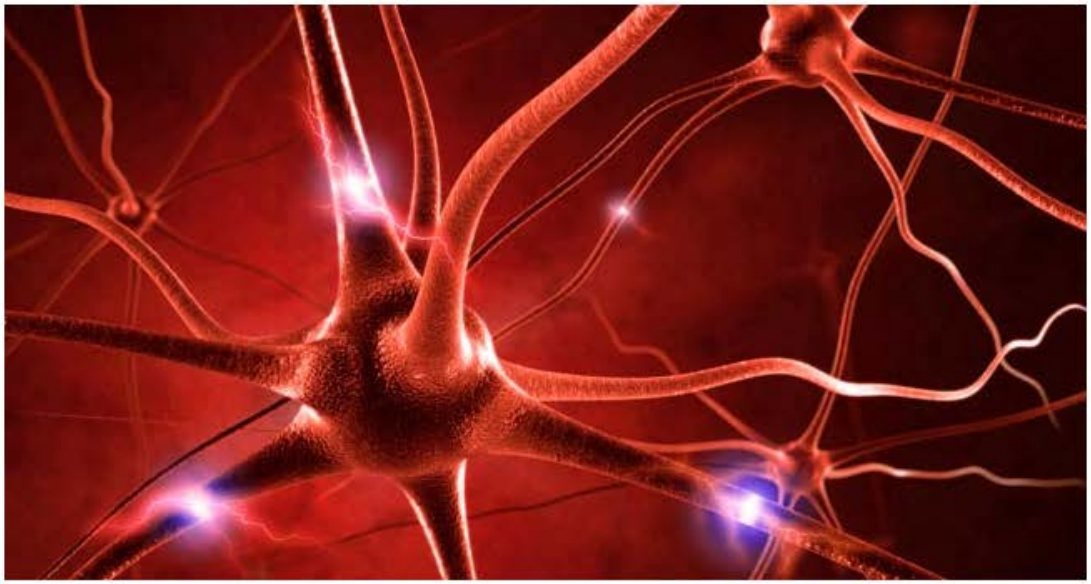

The *Research Network on Law and Neuroscience*, supported by the John D. and Catherine T. MacArthur Foundation, addresses a focused set of closely-related problems at the intersection of neuroscience and criminal justice: 1) determining the law-relevant mental states of defendants and witnesses; 2) assessing a

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Palo Alto, California

March 14–15, 2013

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- Adolescent Decision Making and Legal Responsibility
- Neurobiology of Violence
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- Formation and Detection of Memories
- Sentencing, Risk Assessment, and Re-offending

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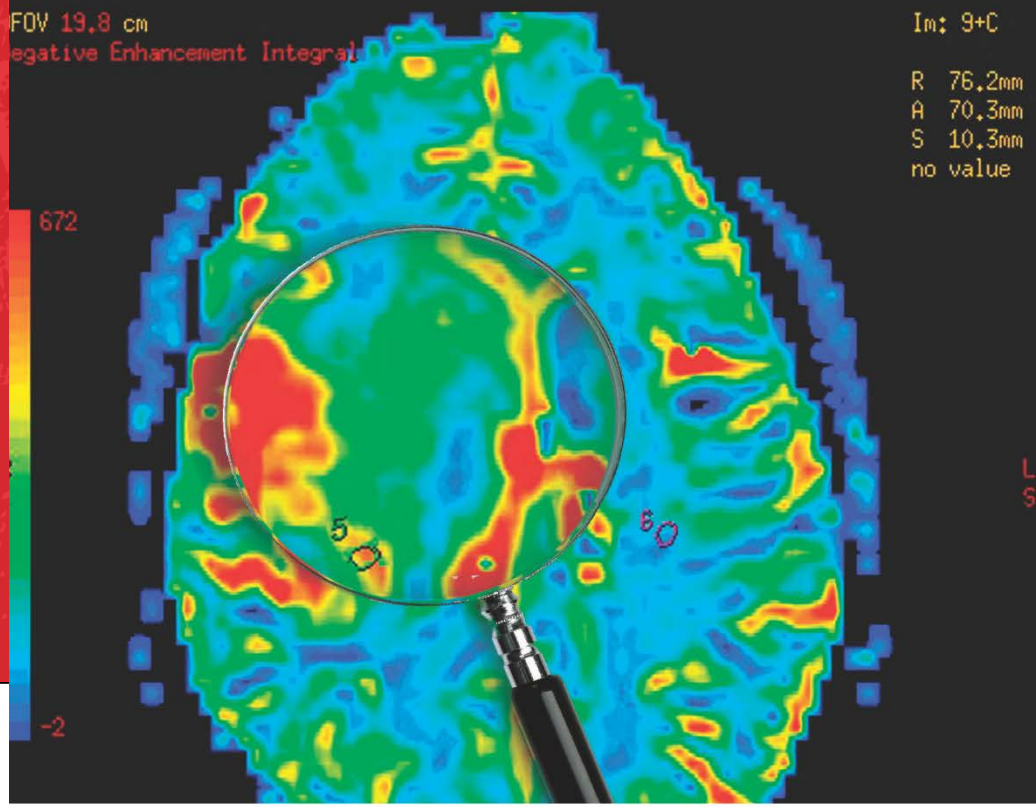

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Three reminders:
Neuroscientific evidence is already being used in law/policy, this use is testimonial, and this use is adversarial.

Rule 403 Balancing:
What do we know about how jurors respond to brain evidence?

The future of admissibility:
The challenge of informative, but incomplete brain evidence

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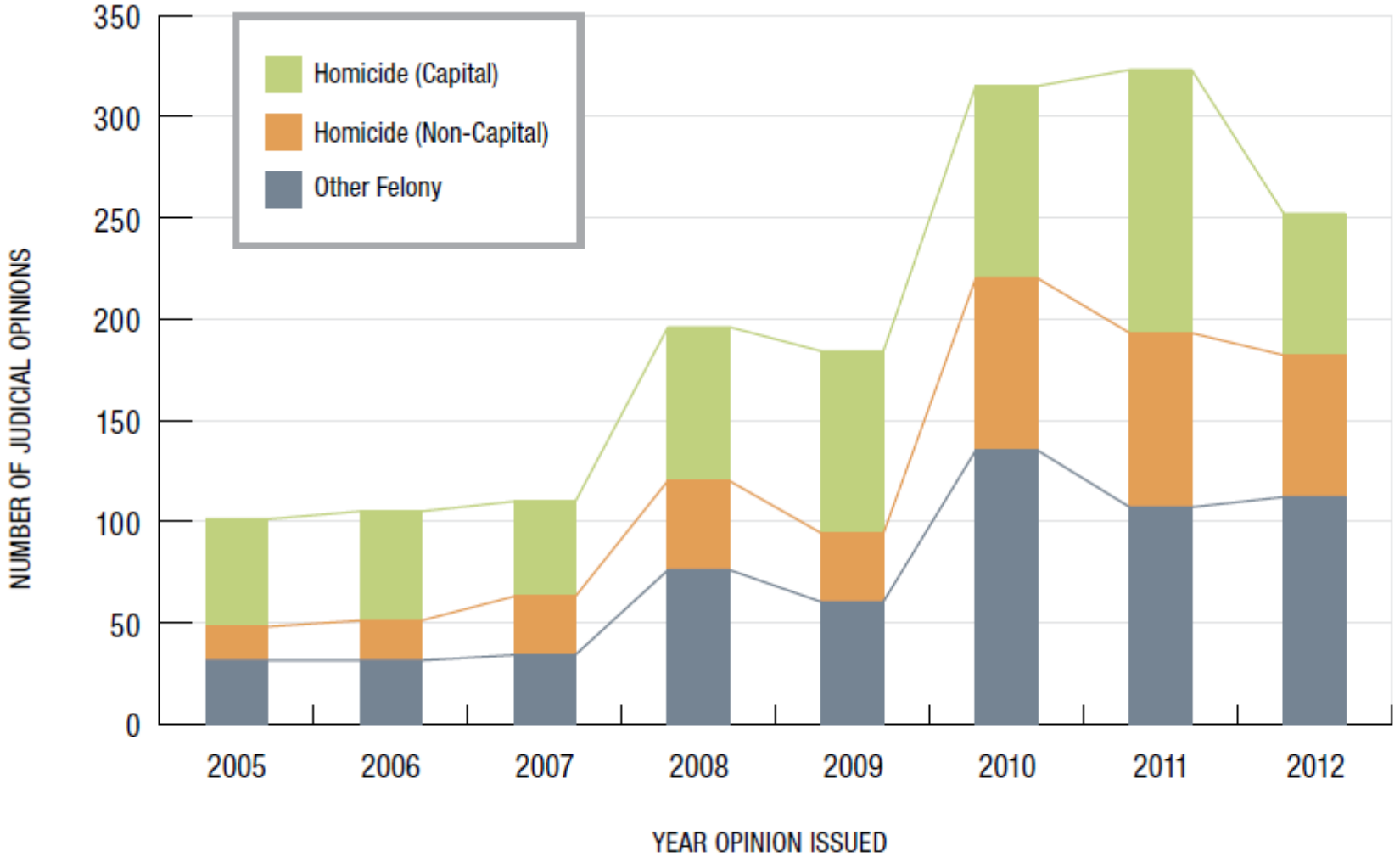
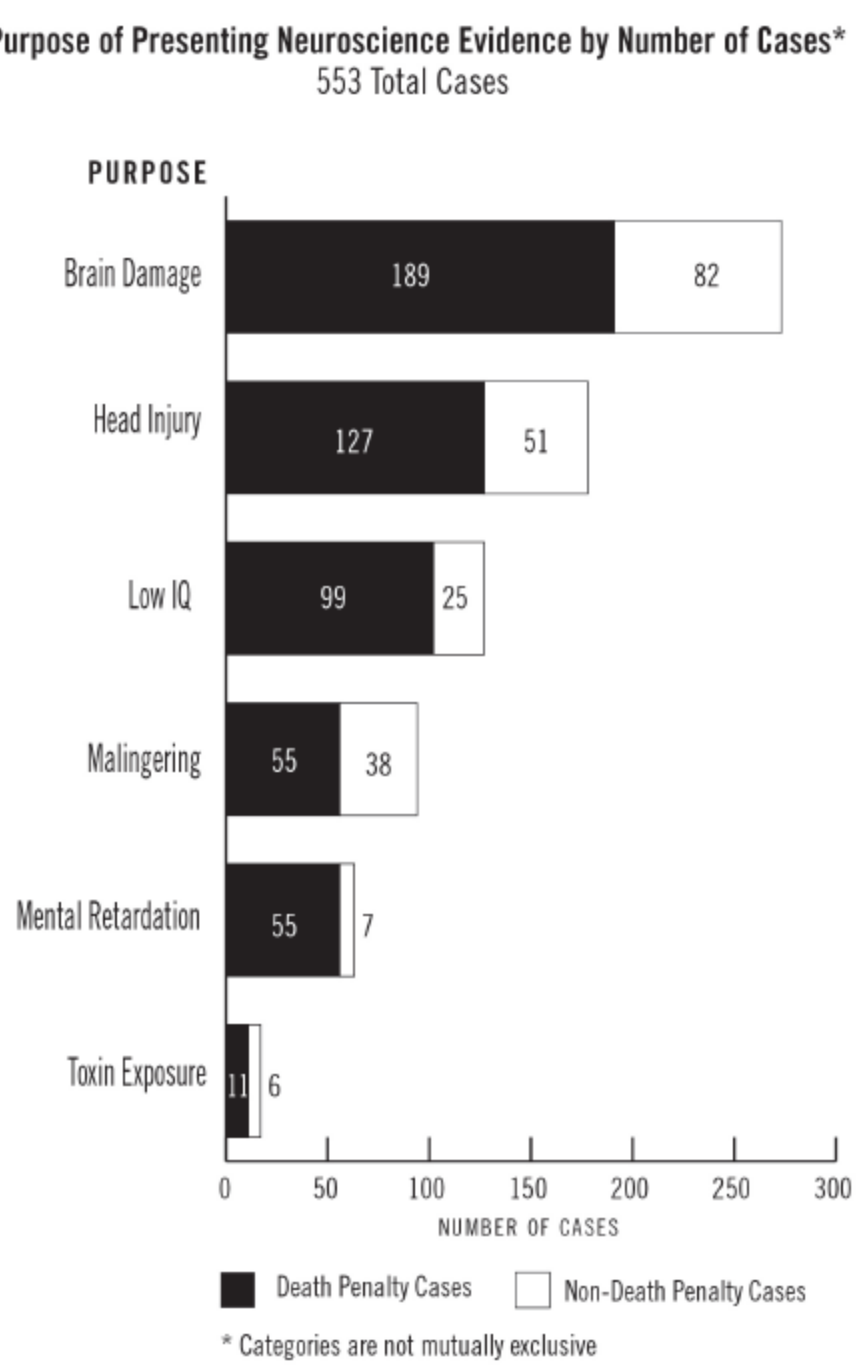
Reminder #1:

Multiple studies have confirmed that neuroscientific evidence is being regularly admitted in a variety of legal contexts.



A total of 1800 judicial opinions (majority, plurality, concurrence, dissent) issued during 2005–2012 were included. Graph and analysis based on 1586 majority and plurality opinions only. Source: Farahany, N., Database 2014. On file at Duke University.

Source: Nita A. Farahany, Neuroscience and behavioral genetics in US criminal law: an empirical analysis, *Journal of Law and the Biosciences* (2015)



Source: Deborah W. Denno, *The Myth of the Double-Edged Sword: An Empirical Study of Neuroscience Evidence in Criminal Cases*, 56 Boston College L. Rev. 493, 547 (2015).

Online: SSRN link

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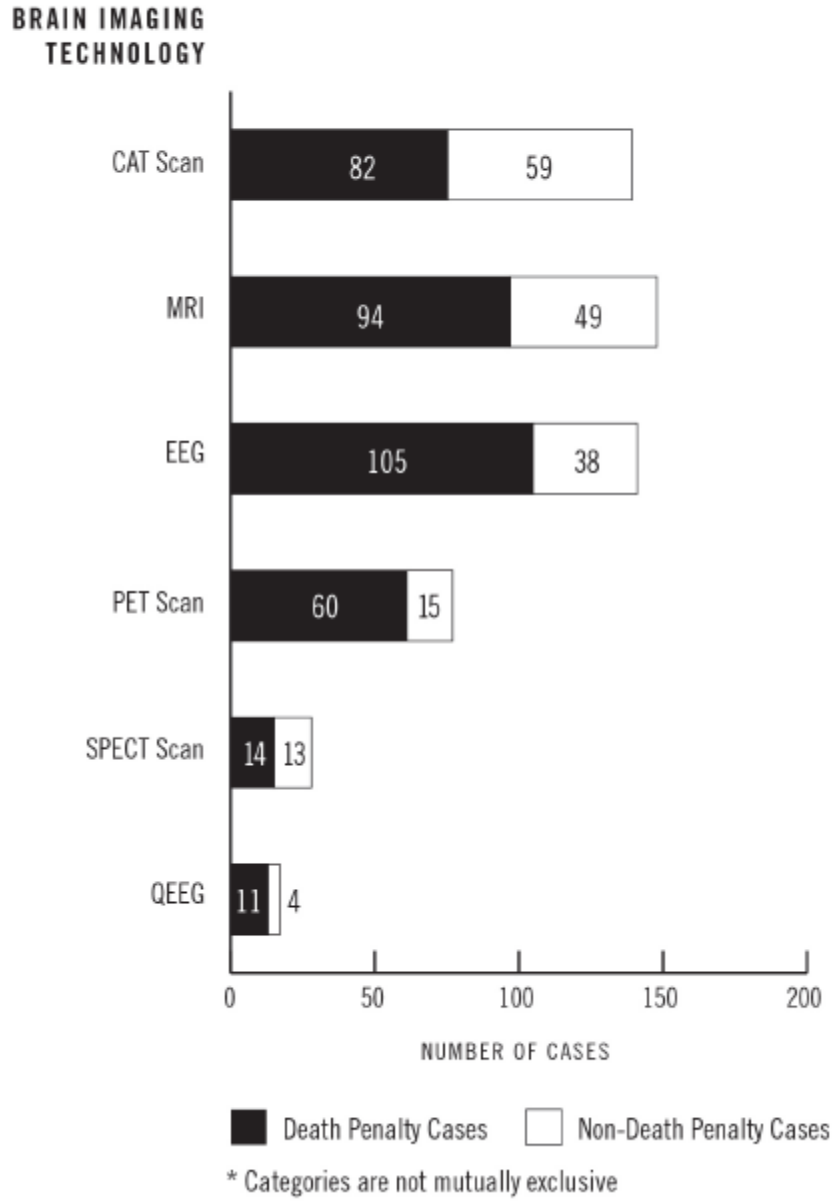
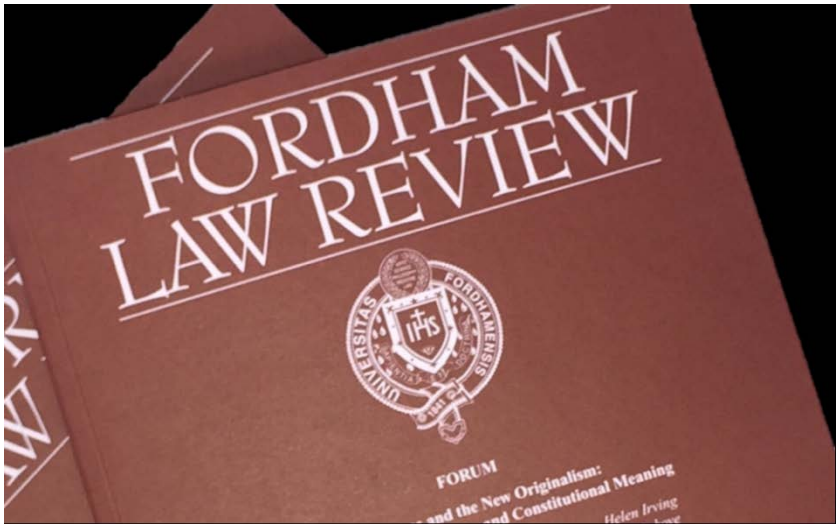
Online: SSRN link

Chart 4

Use or Discussion of Brain Imaging Technology by Number of Cases*

553 Total Cases





THE OVERLOOKED HISTORY OF NEUROLAW

*Francis X. Shen**

INTRODUCTION

I often describe law and neuroscience as a "new" and "emerging" field.[1] This gives neurolaw a shiny gloss and attracts headlines. The claim also is true, in the sense that we are examining the legal implications of new neuroscientific technology and novel findings.

Figure 2: Cumulative Number of American Cases Involving Electroencephalography Evidence, 1930–2016

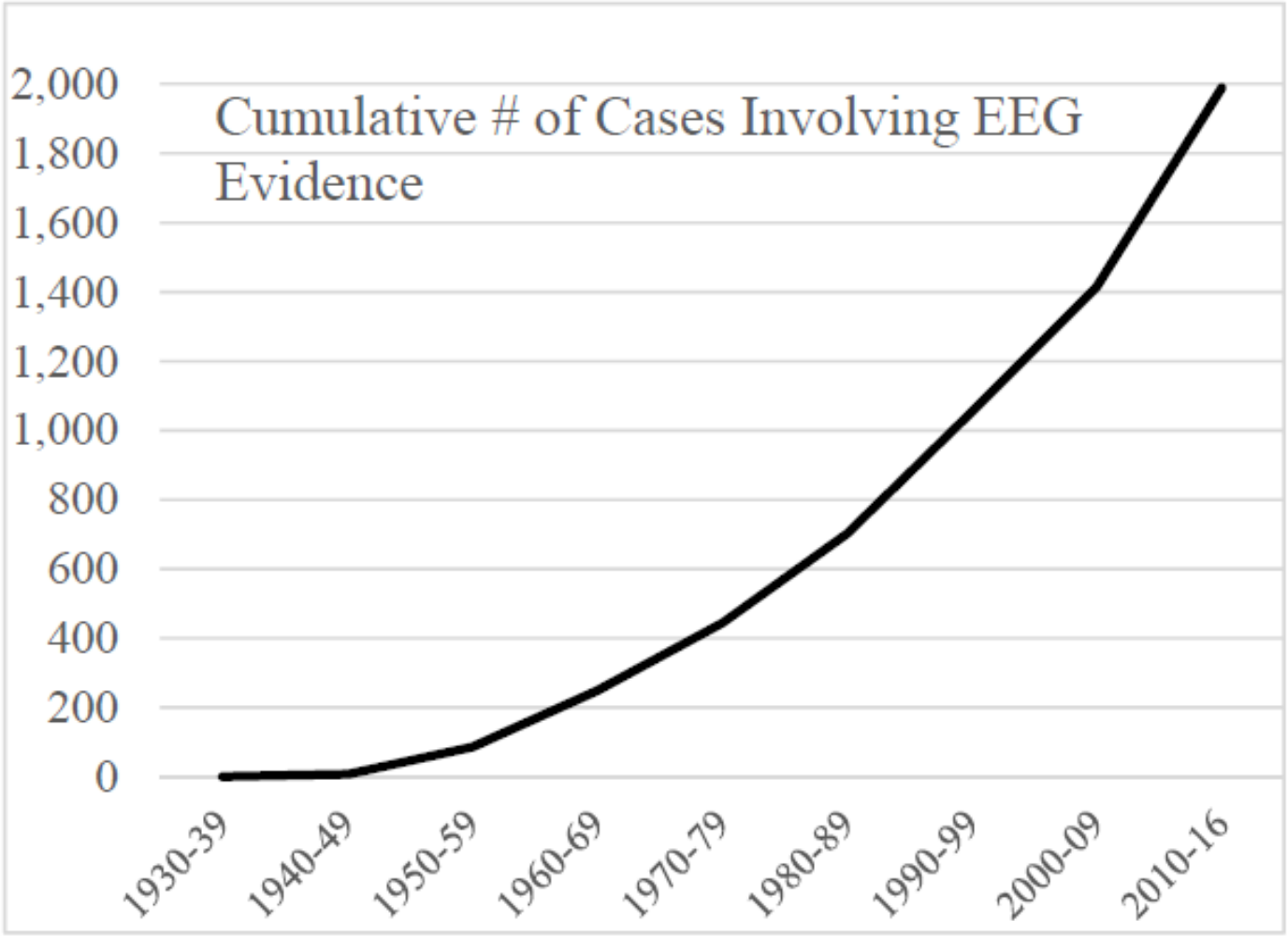


Figure 2 was created based on a search of all state and federal cases on Westlaw Next.[76]

Number of Proposed Brain-Related Bills, by Year (All state legislatures, 1997-2009)

Source: Francis X. Shen, *Neurolegislation: How U.S. Legislators are Using Brain Science*, 29 Harvard Journal of Law and Technology 495 (2016)

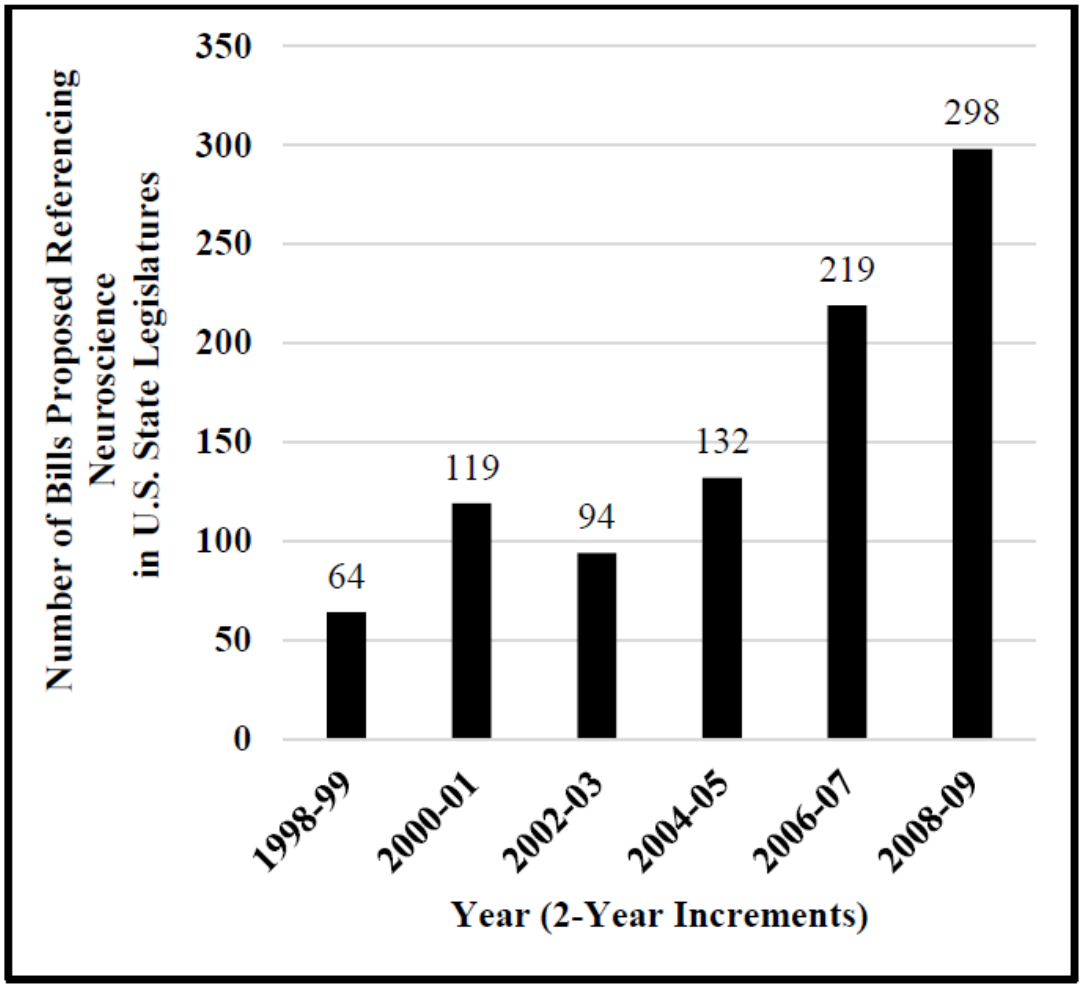


Figure 2: Number of Proposed Bills in U.S. State Legislatures That Reference Neuroscience, 1998–2009
(Summarized in Two-Year Increments)

So ... the question is not *if* neuroscientific evidence should be allowed, but rather *when* a *particular type* of neuroscientific evidence should be allowed for a *particular purpose*.

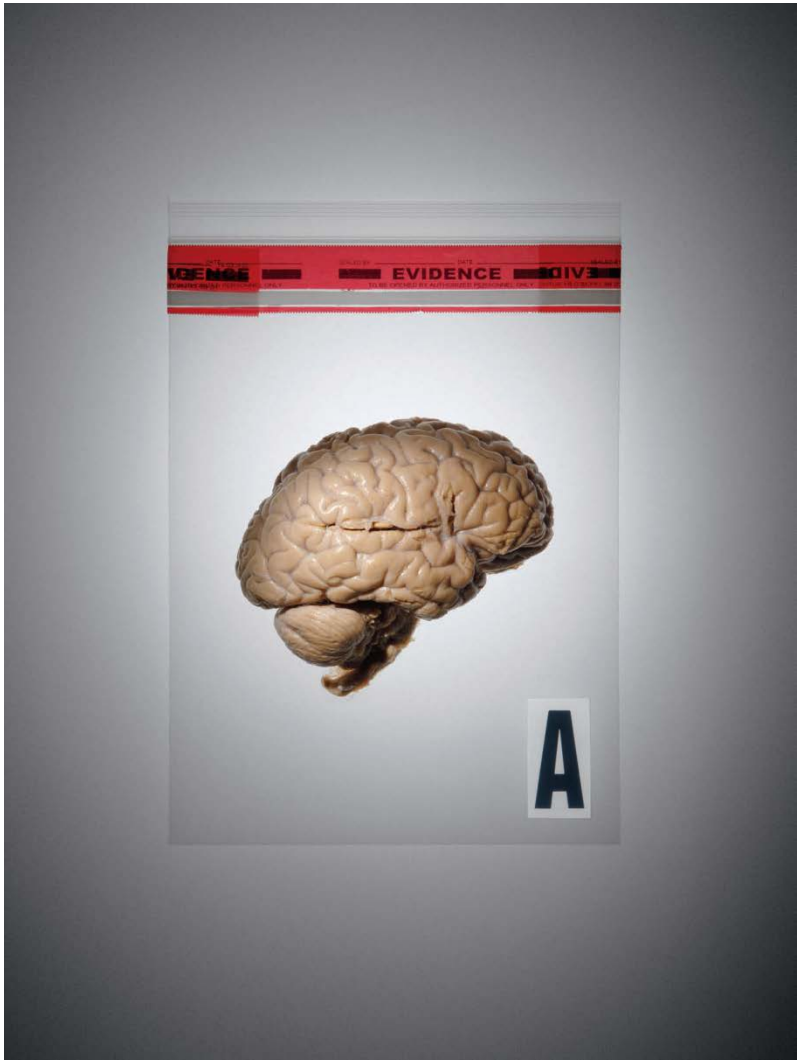
Reminder #2:

In a courtroom, "neuroscientific evidence" is always introduced through expert testimony of a human.

What does neuroscientific evidence in the courtroom look like?

Answer:

It doesn't look like this.



Source: Michael S. Gazzaniga, *Neuroscience In The Courtroom*, 304 SCIENTIFIC AMERICAN 54 (2011).

This is what neuroscientific evidence looks like: a human talking about someone else's brain (and maybe also using images to support that testimony)

Posted March 15, 2017 - 7:06pm | Updated March 15, 2017 - 8:44pm

Doctor says War Machine's brain injury could cause animalistic behavior

War Machine, the former mixed martial arts fighter on trial in connection with an attack on his then-girlfriend ...

Dr. Steven Holper told jurors that the 35-year-old defendant ... had a frontal lobe lesion on his brain that could cause "hyper-sexual" and "very aggressive" behavior.

Reminder #3:

In law and policy, the use of (neuroscientific) “evidence” occurs within a system that is fundamentally adversarial.

Harvard Journal of Law & Technology
Volume 29, Number 2 Spring 2016

NEUROLEGISLATION: HOW U.S. LEGISLATORS ARE USING BRAIN SCIENCE

*Francis X. Shen**

TABLE OF CONTENTS

Neuroscience is increasingly mentioned in proposed legislation, but at present neuroscience reaffirms rather than revolutionizes legislators' preexisting policy commitments.

Plea Bargaining

Motivation!

:: Attorney Stephen Cobb (Florida criminal defense attorney)

ABOUT FLORIDA CRIMINAL DEFENSE ATTORNEY STEPHEN G. COBB

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Industry Recognition

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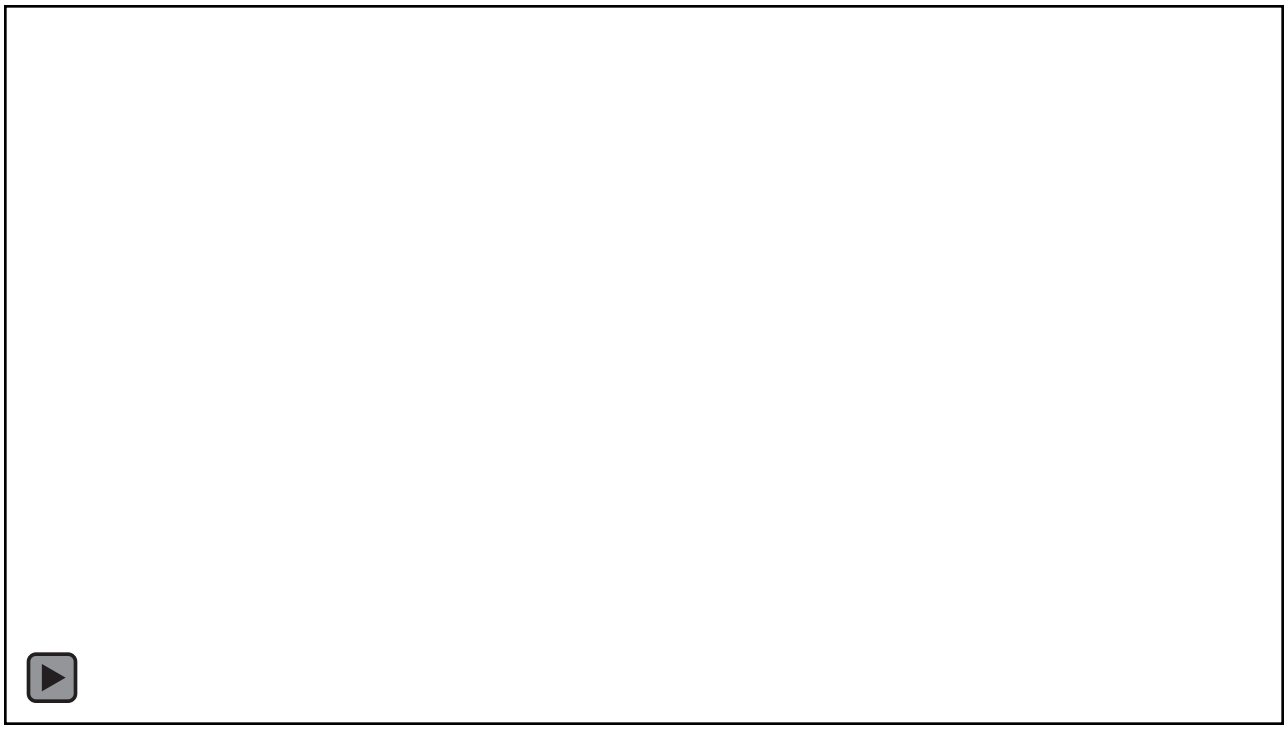
:: Attorney Stephen Cobb (Florida criminal defense attorney)



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Rule 403 Balancing

Rule 403. Excluding Relevant Evidence for Prejudice, Confusion, Waste of Time, or Other Reasons

The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.

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- misleading the jury,
- undue delay,
- wasting time, or
- needlessly presenting cumulative evidence.

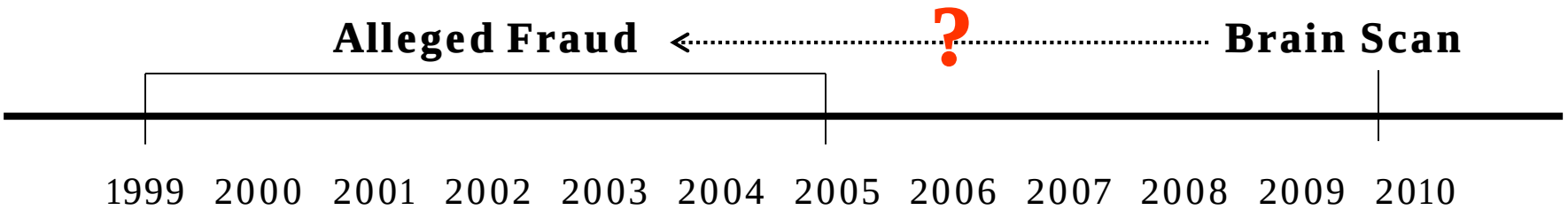
Lie Detection

Gary Smith

Public Safety

The long life of a MoCo homicide case: Two trials, two appeals, third trial on the horizon

A | 2

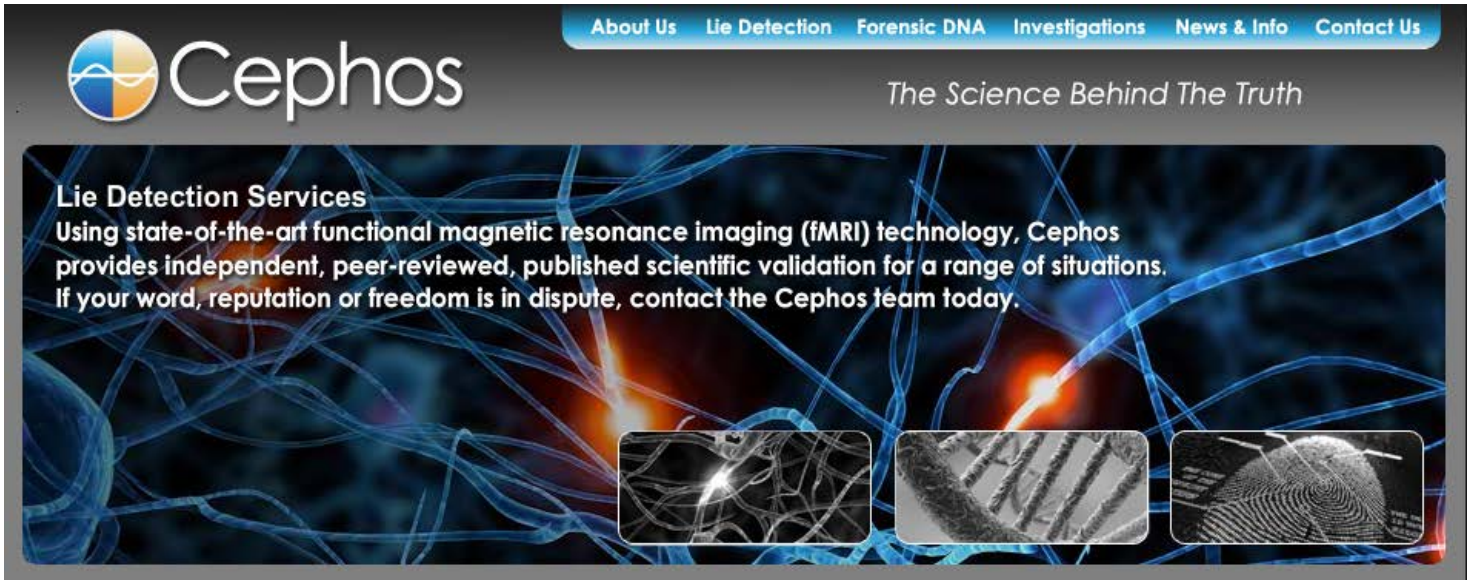


Between 1999 and 2005, did Dr. Semrau "knowingly devise a scheme or artifice to defraud a health care benefit program in connection with the delivery of or payment for health care benefits, items, or services"?

Dr. Steven Laken

In my professional opinion, I, Dr. Steven Laken, conclude that ...

... Dr. Semrau's brain indicates he is telling the truth in regards to not cheating or defrauding the government.



On March 25, the government filed a Supplement to its Motion to Exclude, arguing that in addition to excluding Dr. Laken's testimony under Fed. R. Evid. 702, **the court should also exclude his testimony under Fed. R. Evid. 403**.

Judge Pham's Decision

...

Judge Pham:

Although Dr. Laken is qualified to offer an opinion, the court nevertheless concludes that his testimony should be excluded because, **at least at this early stage in its development, fMRI-based lie detection does not satisfy the requirements of Rule 702.**

Judge Pham's Decision

...

Judge Pham:

... the **danger of unfair prejudice** associated with admitting Dr. Laken's fMRI-based lie detection opinions **substantially outweighs any probative value attributable to them**.

Brain Scans as Evidence: Truths, Proofs, Lies, and Lessons

by Francis X. Shen[*] and Owen D. Jones[**]

I. INTRODUCTION

This *Brain Sciences in the Courtroom Symposium* is both timely and important. Given recently developed and rapidly improving brain imaging techniques that enable non-invasive detection of brain activity, civil and criminal courts increasingly encounter attorneys proffering brain scans as evidence.[1] The reason is simple. In addition to caring about how people act–such as when they cause a person's death or sign a will–the legal system's inquiries frequently turn on determining what people were *thinking*, or were *capable* of thinking, when they acted.

What is the effect of neuroscientific evidence on juror decision-making?

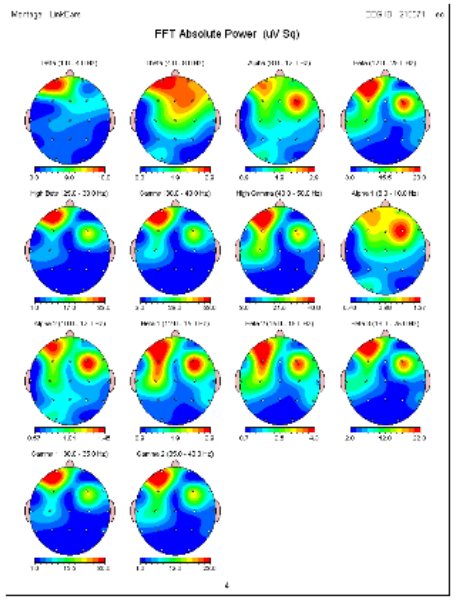
Answer:

We don’t really know.

Brain Exam May Have Swayed Jury in Sentencing Convicted Murderer

By Greg Miller | 14 December 2010 6:54 pm | 0 Comments

Testimony on the brain activity of a convicted murderer may have saved him from the death penalty.



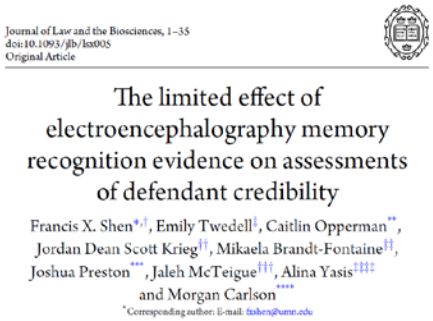
Journal of Law and the Biosciences, 1–35
doi:10.1093/jlb/lsx005
Original Article

The limited effect of electroencephalography memory recognition evidence on assessments of defendant credibility

Francis X. Shen[*,†], Emily Twedell[‡], Caitlin Opperman[**], Jordan Dean Scott Krieg[††], Mikaela Brandt-Fontaine[‡‡], Joshua Preston[***], Jaleh McTeigue[†††], Alina Yasis[‡‡‡‡] and Morgan Carlson[****]

[*] Corresponding author: E-mail: fxshen@umn.edu

Despite nearly thirty previous studies, including over 50 unique experiments, the only result researchers can agree upon is that there are "conflicting results." At present, the "likely effect of neuroscientific evidence in legal settings is still unclear." Or, as Baker et al (2015) describe it in a review, "empirical research into the neuroimage bias has produced what might appear to be a **tangled mess of contradictory findings … [and a] research quagmire**."



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*Corresponding author: E-mail: fishen@umn.edu

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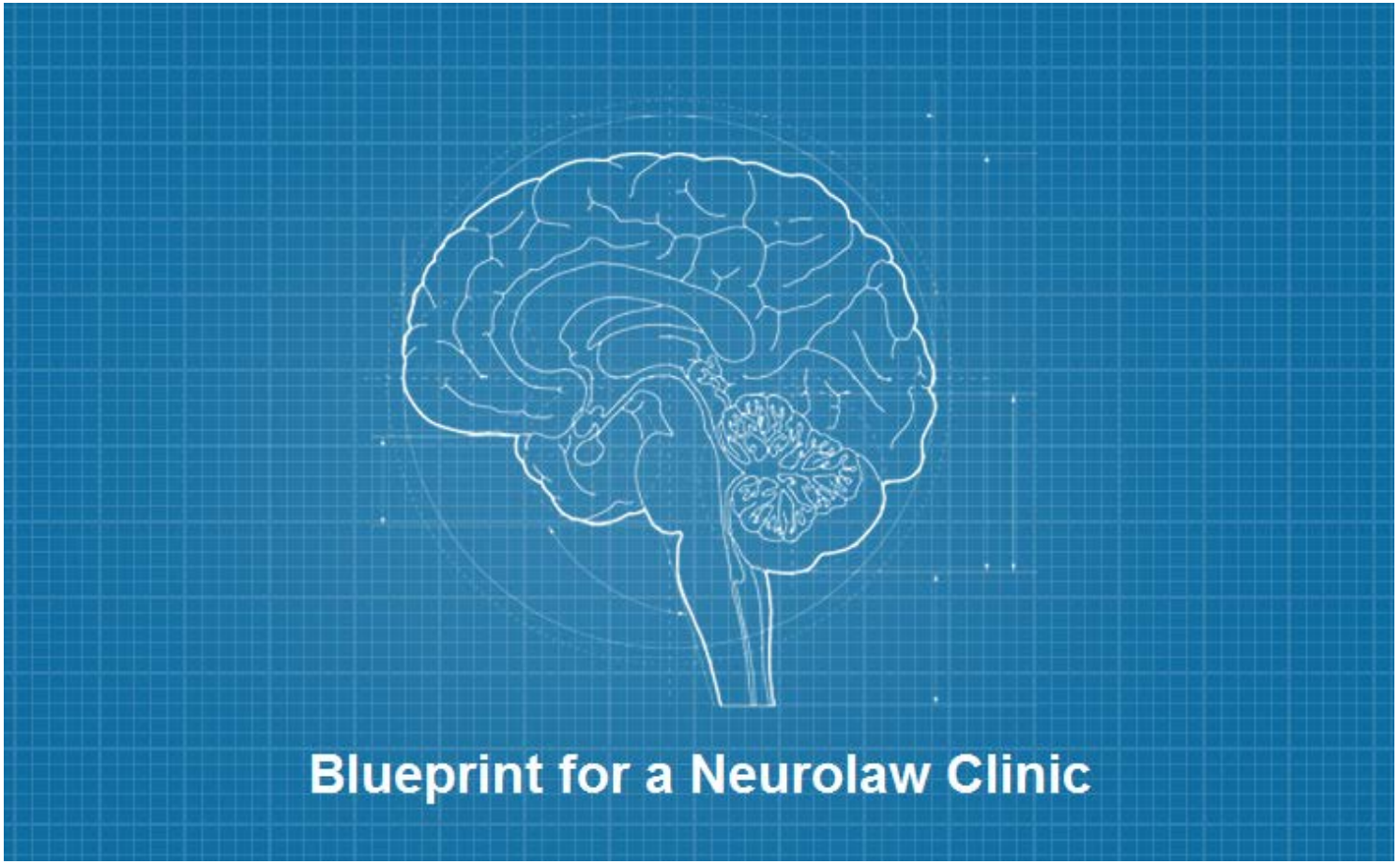
Journal of Law and the Biosciences, 1–7
doi:10.1093/jlb/lsw029
Peer Commentary

Neuroscientific evidence as instant replay

Francis X. Shen

Law School, University of Minnesota, Minneapolis, MN 55455, USA
Corresponding author. E-mail: fxshen@umn.edu

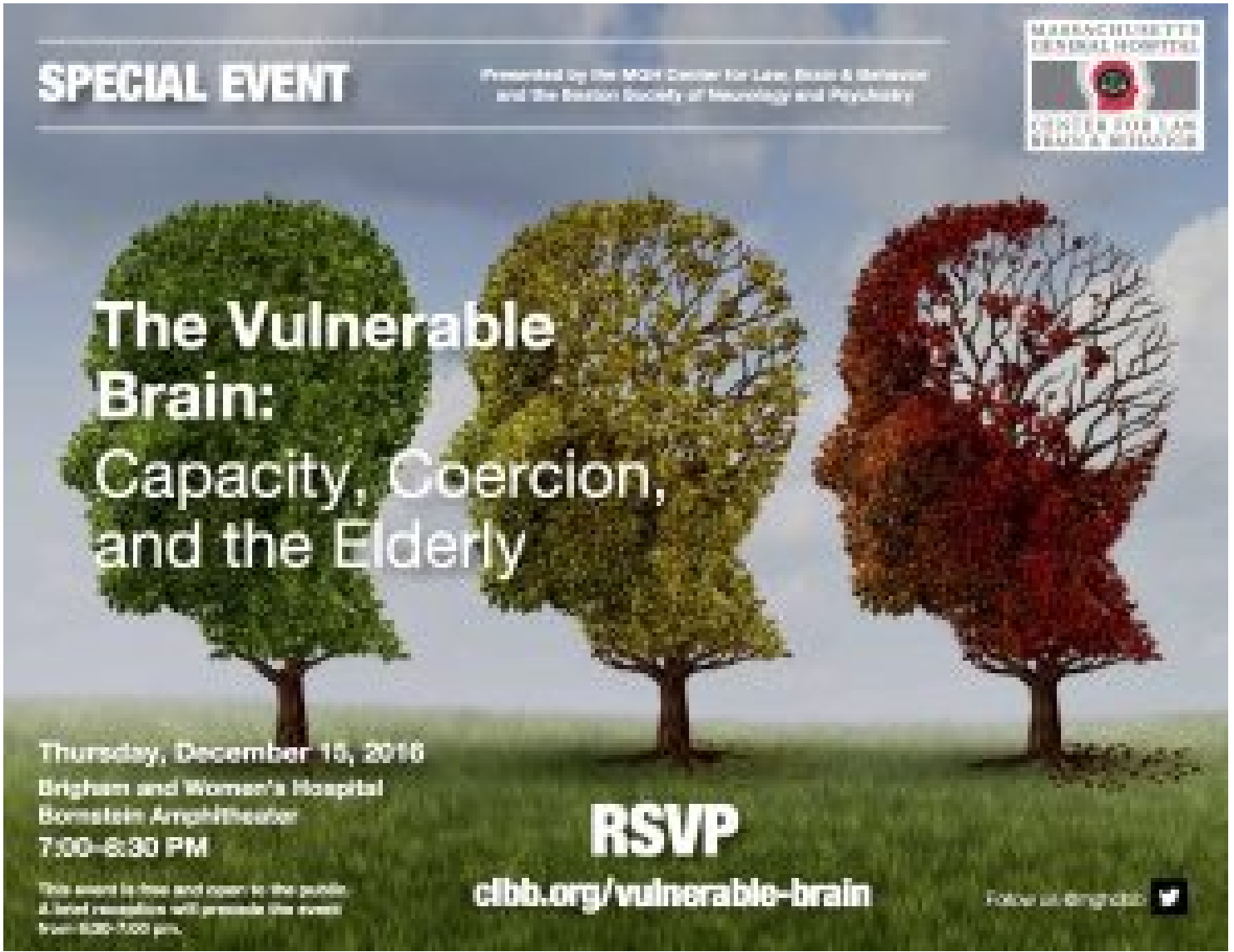

Blueprint for a Neurolaw Clinic

Admissibility of Bio-markers

Admissibility of ~~Bio-markers~~ Bio-*suggesters*


How should the law handle probabilistic biomarkers of mental disorder?
UNCERTAINTY AHEAD

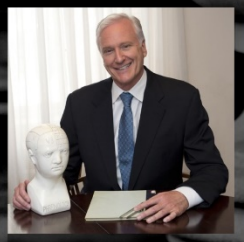
The Aging Brain



Dementia & Democracy

America's Aging Judges & Politicians

Rebecca Brendel, JD, MD
Harvard Medical School and Massachusetts General Hospital



Bruce Price, MD
Maclean Hospital, Massachusetts General Hospital, and Harvard Medical School

Francis X. Shen, PhD, JD
Senior Fellow
Petrie-Flom Center at Harvard Law School & Center for Law, Brain & Behavior at MGH

November 15, 2017
Harvard Law School, Pound Hall, Room 102
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http://petrieflom.law.harvard.edu/events/details/dementia-and-democracy

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Elderly Capacity & the Neuroscience of Aging

Illnesses such as Alzheimer's and dementia have serious ramifications for the legal system, but courts differ on how to assess soundness of mind. Can the neurobiology of decision-making help distinguish between those able to make decisions and those who need protection?

AMA Journal of Ethics®

December 2016, Volume 18, Number 12: 1207-1217

HEALTH LAW

The Legal Implications of Detecting Alzheimer's Disease Earlier

Joshua Preston, Jaleh McTeigue, Caitlin Opperman, Jordan Dean Scott Krieg, Mikaela Brandt-Fontaine, Alina Yasis, and Francis X. Shen, JD, PhD

Abstract

Early detection of Alzheimer's disease (AD) raises a number of challenging legal questions. In this essay, we explore some of those questions, such as: Is a neurological indicator of increased risk for AD a legally relevant brain state before there are any outward behavioral manifestations? How should courts address evidentiary challenges to the admissibility of AD-related neuroimaging? How should the government regulate the marketing of neuroimaging diagnostic tools? How should insurance coverage for the use of these new tools be optimized? We suggest that many voices and multidisciplinary perspectives are needed to answer these questions and ensure that legal responses are swift, efficient, and equitable.


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Our g l is to provide the compre and
definit e imaging services require firming
the pres nce—or absence—of Alzhe isea
at the ear est point possible.

What, if any, legal rights should be taken away based on brain circuit abnormalities?

Photo by Rene Böhmer on Unsplash

When should evidence of neural circuit abnormality be admitted as evidence in elder financial fraud cases?

Photo by Rene Böhmer on Unsplash

What if … the treating physicians relied, in part, on brain imaging in their clinical evaluations?

Photo by Rene Böhmer on Unsplash

What if an individual with dementia is needed to testify about his/her pain – should brain imaging related to pain circuits be admitted?

Photo by Rene Böhmer on Unsplash