BEHAVIORAL SCIENCE IN THE COURTROOM
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Judicial Seminar on
Emerging Issues in Neuroscience

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Presentation Outline

- **Scientific Concepts**
  - Situating Inside Criminal Law
  - Responsibility Claims
    - Involuntariness
    - Un-intentionality
  - Civil Claims
Neuroscience & Behavioral Genetics

**Neuroscience**
- “Normal” brain
- Diminished brain
- Neurotransmitters (e.g. serotonin)
- Brain Damage (e.g. frontal lobe damage)

**Behavioral Genetics**
- Predisposition
- Claim of unusual susceptibility to violence, aggression, addiction, impulsivity, etc.
- General vs. Specific (family history vs. specific genes)
Presentation Outline

- Scientific Concepts
- Situating Inside Criminal Law
- Responsibility Claims
  - Involuntariness
  - Un-intentionality
- Pragmatic and Ethical Issues
- Civil Claims

Based on empirical research from Farahany research database (Source: Westlaw cases)

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Adjudicating Criminal Responsibility

Responsibility Determination

Elements of Crime
- Actus Reus
- Mens Rea

Defenses
- Justifications
- Excuses

Responsibility Determination
- Acquittal
- Conviction
- Appeal

Negating Responsibility
- E.g. Self-Defense

Diminished Responsibility
- Insanity
- Diminished Capacity
- Provocation

Sentencing
Arrests, Pleas, Motions

- **Withdraw of Guilty Plea**: D claims lacked competence to enter guilty plea (either because of a neurological disorder, or drug/alcohol effects on the brain) *

- **Probable cause for arrest**: a neurological disorder explains failure to do alphabet test, not intoxication while driving while driving; **

- **Motion to exclude witness testimony**: neurophysiologist used to introduce research about the unreliability of eyewitness testimony***

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**State v. Greco, 2008 WL 108732 (NJ Super. 2008); State v. Reynolds, 2007 WL 4480641 (1st Cir. 2007)
***Jones v. Woodford, 2008 WL 505230 (S.D. Cal. 2008)
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Adjudicating Criminal Responsibility

Responsibility Determination

Elements of Crime
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Defenses
- Justifications
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- Negates Responsibility
  - E.g., Self-Defense

- Reduces Responsibility
  - Insanity
  - Diminished Capacity
  - Provocation

Trial

Guilty Plea

Acquittal

Conviction

Sentencing

Appeal

BG/NE
**Actus Reus: Claims of Involuntariness**

- **Addiction theory**: criminal act arose from a genetic and/or neurological predisposition to addiction.

- **Control theory**: defendant lacks control over violence, and acts impulsively, much like a reflex or convulsion, rather than a determination of their will.
Involuntariness: Addiction Theory

Claim: drug or alcohol addiction arises from a genetic or neurological predisposition

“if a defendant is compelled to use narcotics due to a serious physical craving (addiction)... the court can find no choice on the part of the defendant since he acts as a result of a compulsion, not from choice...so the argument goes...there is really no guilt involved, merely disease” (United States v. Moore, 486 F.2d at 1150.)
Involuntariness: Addiction Theory

- United States v. Boushack (Wisc. Ct. App. 1995)*, D argued involuntary intoxication because of his biological (genetic + neurologically) based mental illness
  - The court rejected his claim because of insufficient evidence establishing a biological link to his chronic alcoholism

*1995 Wisc. App. LEXIS 378
This claim is largely ineffective, and often backfires. In *People v. Mertz* (Ill. 2005)*, the court rejected defendant’s claim of involuntary addiction to drugs due to genetic predisposition:

- "We believe the effort to blame defendant’s drinking problems upon an alleged genetic or family predisposition was little more than a thinly veiled effort to divert responsibility from defendant for his failure to address his problems and take responsibility for them..."

*842 N.E.2d 618*
Involuntariness: Control Theory

- Claim: Lack of control due to neurological or genetic condition

Chart 2: Denno, Appendix, in *The Impact of Behavioral Sciences on Criminal Law*
Actions “arising” from frontal lobes: *State v. Morris* (S.C. App. 1991)*, appealed his conviction of voluntary manslaughter, arguing that psychiatric testimony at trial demonstrated he suffered from frontal lobe damage

- “a person with physical damage to the frontal brain lobes might respond with greater emotion than a normal person to any particular situation. . . . [S]uch an emotional response is not voluntary if it results from frontal lobe brain damage.”

- Forensic psychiatrist stated a person with frontal lobe brain damage could have an impaired ability to control his emotional reaction to stimulus

- The court rejected Morris’s claim, because “there was no evidence that [the defendant] involuntarily pulled his gun and shot [the victim]  

*415 S.E.2d 819*
Involuntariness: Control Theory

- *Von Dohlen v. State* (S.C. 2004)*, D claimed his act of homicide was involuntary because it was a product of his disease, not his conscious awareness
- Suffered severe depression for which he had a genetic predisposition
- Psychiatrist testified that as a result of “his altered mental state, ‘[the murder] was not a volitional thing but out of his conscious awareness or control.’”
- Court granted post-conviction relief finding that the genetic testimony should have been allowed at trial because there is a reasonable probability it would have changed the outcome at trial

* 602 S.E.2d 738
Philosophical Tension underlying volition – presumptions of agency

- “The underlying premise of our political and legal institutions in that men and women are free agents, free to choose between right and wrong. The Bill of Rights of the United States Constitution, the Declaration of Rights of the Utah Constitution, and the Declaration of Independence are all premised on that fundamental proposition, as is our criminal law.” State v. Herrera, 895 P.2d 359, 376 (Utah 1999) (Stewart, J. dissenting)

- “[T]here is a set of legal concepts and a different set of metaphysical concepts. . . . [T]he fact that the determinist or free-willist uses the word ‘free’ or ‘compelled’ should not lead us into thinking that he is talking about the issues that are relevant in law.” (Herbert Fingarette, The Meaning of Criminal Insanity)
Mental State: Claims of Unintentionality

- Impulsivity: D unable to plan or premeditate, because of impulse control disorder

- Capacity: D lacked the capacity to form the necessary mental state because of biological/neurological condition

- Diminished Capacity and Predisposition Claims: D should be held less responsible because his actions were a product of his genes/brain, not his bad character

- Insanity Defense: to Bolster or to establish a new mental disease or defect
Mental State: Impulsivity

- **Claim:** neurological basis for impulsivity
  - MAOA, Child Abuse, and Violence (genotyping & neuroimaging)
  - 5-HTT, Stress, and Depression (genotyping & neuroimaging)
  - *State v. Payne,* Tenn. Crim. App. (2003), D was convicted of second-degree murder
    - Trial expert testified that D had low serotonin levels, and thus his “capacity to control impulse . . . [was] virtually non-existent”
    - 5-HTT evidence was used:
      - To negate mental state for second-degree murder
      - For provocation defense due to no impulse control
      - As mitigating evidence during sentencing
- All three claims rejected because the circumstances demonstrated premeditation, and the D himself, not the victim, provoked him
In *State v. Idelfonso-Diaz*, 2006 WL 3093207 (Tenn. Crim. App. 2006), defendant introduced MRI, PET and EEG brain scans
- Expert testified that these abnormalities, with history of abuse, likely impacted his decision to shoot his victim
- State sought to suppress the evidence
- Court held testimony inadmissible b/c did not show lack of capacity

PET images of the brain of a normal person (left), a murderer with deprived background (middle) and a murderer with non-deprived background (right). Areas in red and yellow show a higher metabolic activity, and in black and blue of lower metabolic activity. The brain of a sociopath (right) has a very low activity in many areas, but is strikingly absent in the frontal area (upper part of the images). Images: Adrian Raine
Mental State: Distinguishing Motive

- Many of these claims fail by addressing a defendant’s motivation to act, not intent to engage in the conduct.
- E.g., in *People v. Bobo*, 3 Cal. Rptr. 2d 747 (Cal. Ct. App. 1990), Diane Rochelle Bobo claimed that she could not premeditate the stabbing and drowning of her three children and therefore should not have been found guilty of first-degree murder (three counts).
  - A trial, experts testified that Bobo suffered from delusions and paranoid schizophrenia, onset by genetic factors, biochemical elements, and developmental experiences.
  - The California Court of Appeals rejected her claim, noting a distinction between objective intent to kill and subjective motivation to kill.
Mental State/Excuses: Insanity

- Some defendants have successfully introduced behavioral genetics or neuroscience evidence to bolster diagnosis of a mental disease or defect for the insanity defense.

- But when behavioral predisposition evidence is introduced to alone substantiate a mental disease or defect, it has been rejected as a matter of law.
  - E.g., in *State v. Johnson*, 549 N.E.2d 565 (Ohio Ct. App. 1989), the appellate court reversed a trial court decision allowing the defendant to plead insanity because his genetic predisposition, coupled with bad nutrition, caused him to react to stress in a compulsive, abnormal fashion.
  - The court concluded that the defendant’s condition did not satisfy the mental defect element for an insanity defense defense (unrecognized partial diminished capacity).
Sentencing

Acquittal

Conviction

Mitigating Evidence

Aggravating Evidence

NE/BG

Release

Incarceration

Commitment

Probation

Death Penalty

NE/BG
The majority of defendants introduce behavioral genetics and neuroscience to mitigate their culpability and punishment.

Although there is mixed success in the use of this evidence in sentencing, it has particular salience when the condition is *treatable*.

- E.g., in *Hill v. Ozmint*, 339 F.3d 187 (4th Cir. 2003), during the sentencing phase of the capital trial, Hill’s defense counsel argued his aggressive impulses arose from serotonin deficiency “attributable to genetics.”

- After his arrest and incarceration, Hill began prescription medication that experts were to testify successfully curbed his aggressive impulses.

- Theory of mitigation: “the death penalty was not warranted because Hill’s aggressive behavior was genetic (i.e., beyond his control) and treatable,” and he had in fact been treated and now a behaved as a different person.
Sentencing: Mitigation

- *Crook v. State*, 813 So.2d 68 (Fla. 2002) claimed that his organic brain damage predisposed him to fits of violence.

  - The claim is that his bad behavior arose from his brain and upbringing rather than his bad character (*it’s not me, it’s my biology*).

- The Supreme Court of Florida vacated his death sentence and remanded the case to the trial court:

  - “Clearly, the existence of brain damage is a significant mitigating factor that trial courts should consider in deciding whether the death sentence is appropriate in a particular case.”
Still other courts grapple with how the evidence **links to the crime**, and what **weight to assign** it

- **Link**: State v. Roberts, the court found that Roberts, who was convicted of capital murder of a 12-year-old girl, had failed to introduce a link between the psychological & neurological evidence and his ability to control his emotions or actions.

- **Weight**: in Morris, an expert testified that people with frontal lobe damage act against the odds and commit unplanned crimes. The court assigned this **some mitigating weight**, because it impacted the defendant’s ability to act rationally but did not render him powerless to do so.
Sentencing: Aggravating

- Behavioral predisposition evidence may be a **double-edged sword** for against some defendants during sentencing
  - Used to denigrate the character of the defendant, justify longer sentencing, or to label the defendant as dangerous
- E.g., in *Schriro v. Landrigan* (2007), Jeffrey Landrigan appealed his death sentence on the theory that his trial counsel was ineffective for failing to present mitigating evidence on his behalf
  - Claimed should have introduced mitigating evidence to show his “biological background made him what he is”
  - The Ninth Circuit initially rejected his claim, finding that a jury could equally find such evidence aggravating by viewing him as a “genetically programmed to be violent”
  - Reheard *en banc*, and reversed and remanded, in part, for a new evidentiary hearing on sentencing
  - US Supreme Court found that “assuring the court that genetics made him the way he is could not have been very helpful”
Can neuroscience bolster claims of innocence?
- Deception-detection/lie-detection technology: fMRI lie-detection technology, other technology has been introduced in India, and in two US cases to date
- Guilty knowledge test: largely discredited, but based on the theory that certain parts of an individual's brain would reveal if presented with prior knowledge

Can new neuroscience help us “see” intentions where we couldn’t before?
- Research into intentionality (Brain-Machine Interface- trying to capture what intentionality looks like in the brain)
- Problems with identifying intention at the time of the alleged crime

Can fMRI or other brain scan technology help us read thought, biases, associations with others, etc? If so, should it be admissible?
- What are the 4th and 5th Amendment implications?
- Will the new “drug cases” arise over cognitive enhancers
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Substantiate “invisible” injuries (e.g. concentration, headache, fatigue),

E.g. Plaintiff* brought an action under the Federal Employers' Liability Act (FELA), alleging injuring from inhalation of fumes while employed as a conductor of a railroad

- Introduced SPECT scan to show that he suffered from toxic encephalopathy from an unknown toxin, purportedly under the control of the railroad
- Evidenced excluded, because no showing of a causal link between railroad actions or omissions
- Fail on causation issues** showing that the toxin caused the injury

*SPECT scans show reduced blood flow to the brain in toxic encephalopathy.


**Andreu ex rel. Andreu v. Secretary of Dept. of Health and Human Services, 569 F.3d 1367 (Fed. Cir. 2009) (Reversing and remanding denial of compensation for parents who sued, under National Childhood Vaccine Injury Act, for son's seizure disorder allegedly caused by inoculation with diphtheria, whole-cell pertussis, and tetanus (DPT) vaccine)
Victim Tort Injuries

When a specific, traumatic injury, is identifiable, SPECT and other neuroimaging technology has proven quite powerful

- E.g. Plaintiff motorist, who was rear-ended by a school bus, introduced SPECT scans
- Expert testified that, with the patient's history and the SPECT scan results, P's injuries were consistent, within a certain level of probability, with a traumatic brain injury
- Expert did not compare plaintiff's scan with that of a “normal” baseline scan, but stated that no such scan exists; only experience reviewing SPECT scans

May create a presumption that without neuro-imaging, there is no injury.

-- E.g. Tassinari v. Key West Water Tours, 2007 WL 3238678 (S.D. Fla., 2007) (P denied recovered for alleged brain injury when, after a boating accident, diagnostic studies, including an EEG, a CT scan and a brain MRI scan, all of were negative)
Child Custody Disputes

- State agencies and parents, are using neuroimaging as a basis to challenge parental rights and ascertain the “best interest of the child”
  - In re H.P. 2009 WL 1272415, single mother’s parental rights terminated, in part, due to her traumatic brain injury and resulting cognitive impairments
  - In re G.V. 674 S.E.2d 479, neurological evidence about the child development’s was used to determine whether termination of parental rights was in the best interest of the child
  - In re R.P. 957 A.2d 1205, where evidence from neurological scans was used to confirm abuse rather than other causes of a child's injuries, as part of parental termination of rights
Further Reading