

## Memory Evidence Neuroimaging in the Courts with Professor Emily Murphy

- Brain imaging evidence of memory
  - Example of Aditi Sharma case: State of Maharashtra v. Sharma (June 12, 2008), Case No. 508/07, Sessions Court, Pune (India)
    - Sharma convicted of murder, based on brain-based memory detection evidence derived from Brain Electrical Oscillations Signature (BEOS) Test.
    - The Indian Supreme Court later held that evidence derived from tests like the BEOS Test is not admissible if they were conducted without consent. *Selvi v. State of Karnataka* (2010) AIR 2010 SC 1974.
  - Brain image evidence used in courts
    - Mainly used in criminal but may also be used in civil cases.
    - Memory detection vs. lie detection
      - Memory detection: whether subject has autobiographical or experiential knowledge of an event. Requires test administrator to have knowledge about the ground truth.
      - Lie detection or guilty knowledge tests: whether subject is being truthful in statements.
  - What is a brain image
    - Electroencephalography (EEG)
      - Measures electrical activity waveform (e.g., P300 event related potential (ERP)) through electrodes placed on head
    - Functional magnetic resonance imaging (fMRI)
      - Uses magnetic fields and radio waves to detect differences in blood oxygenation levels in the brain. Subject must remain very still during the test.
    - Biological limitations of memory
      - Subjective memory state vs. objective experiential history
        - Subject may be truthful and believe to have experiential knowledge. May have false memories. fMRI tests may not be able to distinguish between false memory and experiential knowledge.
- Admissibility in the courts
  - Relevance
    - Admissible evidence must be relevant.<sup>1</sup>
      - Memory imaging evidence generally would not be admissible to assess *mens rea*.

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<sup>1</sup> FED. R. EVID. 401.

- May be admissible to in cases where the disputed issue is the facts about the past event. E.g., corroborate witness testimony.
- Whether it should be admissible to evaluate the sincerity of a witness or defendant or whether credibility assessments are solely for the jury to decide.
- Reliability
  - Daubert standard. *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 (1993).
    - Whether the technique or scientific knowledge has been tested,
    - Whether it has been subjected to peer review and publications,
    - Known or potential rate of error
    - Existence and maintenance of standards controlling the technique's operations, and
    - Whether there is widespread acceptance in the relevant scientific community.
  - Frye standard. *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).
    - Whether the method is generally accepted by the particular field.
  - Should judges be gatekeepers?
- Probative value
  - Relevant evidence may be excluded 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.<sup>2</sup>
  - What is the impact of brain imaging evidence on jurors? How do jurors understand the perceive such evidence?
  - If the technology for brain memory imaging were perfect, should it be used in courts?
    - Concept of cognitive liberty or bodily integrity. Implicates:
      - Fourth Amendment right against unreasonable search and seizure
      - Fifth Amendment right against self-incrimination
        - Supreme Court found that involuntary blood alcohol test does not violate Fifth Amendment right against self-incrimination. *Schmerber v. California*, 384 U.S. 757 (1966). Are memories testimonial or akin blood alcohol levels?

## Resources

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<sup>2</sup> FED. R. EVID. 403.

- Emily R. Murphy and Jesse Rissman, *Evidence of Memory from Brain Data*, J. L. & Biosci.1 (2020). Available at: [https://repository.uchastings.edu/faculty\\_scholarship/1805](https://repository.uchastings.edu/faculty_scholarship/1805).
- Emily R. Murphy, Teneille R. Brown, Adina Roskies, and Walter Sinnott-Armstrong, *Brain images as Legal Evidence*, 5 Episteme 359 (2008). Available at: [https://repository.uchastings.edu/faculty\\_scholarship/1508](https://repository.uchastings.edu/faculty_scholarship/1508).