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## MANUSCRIPT

# NEUROIMAGING AND THE LAW: TOWARD A "*NEURO-DAUBERT*" EVIDENTIARY FRAMEWORK FOR COGNITIVE EVIDENCE

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### INTRODUCTION

Neuroscience research increasingly illuminates "cognition, emotion, and social processes."[1] There is no doubt that the human brain plays an integral role in criminal law and the courtroom, whether that is determining what is occurring inside a defendant's brain or to better understand the mental aspect of these kinds of trials.[2] Its legal implications, however, outpace the capacity of existing evidentiary doctrine. As former federal Judge Bernice Donald argued, "as

[*] Juris Doctor candidate, Oklahoma City University School of Law, May 2026. I would like to express my sincere gratitude to my family and friends for their continued support throughout my law school journey—especially my parents, Amy and Jeff Freshwater, whose encouragement and belief in me made this accomplishment possible. I also extend my appreciation to the members of the Oklahoma City University Law Review for their guidance, dedication, and commitment to the successful publication of this piece.

1. Martha J. Farah, *Neuroethics: The Ethical, Legal, and Societal Impact of Neuroscience*, 63 ANN. REV. PSYCH. 571, 572 (2012).

2. *Id.* at 586-87 (explaining that the "growing use of brain scans in courtrooms" will aid in "chang[ing] our laws, ethics, and mores").

neuroscience technology becomes more widely available and reliable" it is essential that we "take proactive steps to confront such challenges and develop well-prepared and well-reasoned responses to address them."[3] Current evidentiary standards, like *Frye*[4] and *Daubert*,[5] are structurally incapable of addressing technologies that purport to probe the mind. The integration of neuroimaging into criminal adjudication demands a recalibration of evidentiary standards. This Manuscript argues that neuroimaging evidence should not be admitted under existing evidentiary frameworks. Instead, courts should adopt a new, distinct "*Neuro-Daubert*" standard. That standard would incorporate constitutional protections against compelled cognitive exposure, safeguard against juror overreliance on scientific imagery, and address evidentiary implications. Only through such a framework can courts ensure that neuroimaging supports, rather than undermines, justice.

This Manuscript begins with the background of visualizing the structure of a human's brain, as well as the background on functional magnetic resonance imaging ("fMRI") and its implications in the legal field. Then, this Manuscript proceeds in two parts that discuss different aspects and impacts of neuroimaging in law. Part I examines the rise of portable neuroimaging and the privacy concerns it raises, and Part II explains why the *Daubert* standard is structurally inadequate for neuroimaging and introduces the "*Neuro-Daubert*" standard as a doctrinal solution.

## BACKGROUND

### I. Visualizing the Brain: Techniques and Legal Relevance

Before turning to the legal implications of functional imaging, it is useful to review the major techniques for visualizing brain structure. Four primary modalities have shaped both medical diagnostics and, indirectly, the courtroom: X-ray, computed axial tomography ("CAT" or "CT"), magnetic resonance imaging ("MRI"), and diffusion tensor imaging

3. JUDGE BERNICE B. DONALD, U.S. CT. OF APPEALS FOR THE SIXTH CIR., PROBING THE MIND: NEUROSCIENCE, THE RULES OF EVIDENCE, AND THE CONSTITUTION 17 (2013), https://www.antoniocasella.eu/dnlaw/DONALD_2013.pdf (presented at the Biotechnology and Science Panel of the 57th Union Internationale des Avocats Congress).

4. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).

5. Daubert v. Merrell Dow Phrams., Inc., 509 U.S. 579, 593-94 (1993).

("DTI").[6] Each offers distinct advantages and limitations.

### A. X-ray

As the earliest imaging tool, X-rays provide "high spatial resolution (about 0.1mm), but they lack contrast."[7] Because the brain is less dense than bone, its features appear distinct.[8] Nevertheless, X-rays retain diagnostic value by indirectly detecting cysts, tumors, or cranial fractures from changes in the surrounding bone or through advances in contrast agents and digital enhancements.[9] While no longer the standard tool for neuroimaging, X-rays remain a foundational technique in medicine.[10]

### B. Computed Axial Technology

Introduced in the 1970s, CAT or CT scanning revolutionized brain imaging by using rotating X-ray beams to generate cross-sectional images reconstructed into three dimensions.[11] These scans are quick, non-invasive, and highly effective in emergency settings where physicians must quickly and accurately detect a blood clot, an aneurysm, or internal injuries, for example.[12] However, these scans offer less soft tissue contrast than an MRI, limiting CAT's utility for detailed examinations of the brain's anatomy.[13] Despite this limitation, CAT or "CT scans [have] bec[o]me the standard of care for detection and diagnosis of neurological damage."[14]

### C. Magnetic Resonance Imaging

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6. *See* OWEN D. JONES, JEFFREY D. SCHALL & FRANCIS X. SHEN, LAW AND NEUROSCIENCE 103-106 (2d ed. 2021).
7. *Id.* at 103.
8. *Id.*
9. *Id.*
10. *See id.*
11. *Id.*
12. *CT Scans in Emergency Medicine: Quick and Precise*, LAKE ZURICH OPEN MRI, https://lakezurichopenmri.com/ct-scans-emergency-medicine/#:~:text=Speed%20and%20Efficiency,to%20organ%20damage%20and%20tumors [https://perma.cc/B4KD-M6DQ] (last visited May 25, 2026).
13. JONES, SCHALL & SHEN, *supra* note 6, at 103-04.
14. *Id.* at 103.

The MRI scan represented a major leap forward by avoiding ionizing radiation and producing superior soft tissue contrast.[15] Using magnetic fields and radiofrequency pulses to manipulate the alignment of hydrogen atoms in the body, an MRI yields highly detailed images of brain structures, making it the gold standard for detecting tumors, malformations, or diseases.[16] Although this kind of imaging is more expensive and slower than imaging such as a CT scan, it is still far superior in soft tissue contrast and diagnostic depth.[17]

### D. Diffusion Tension Imaging

The DTI scan is a specialized form of an MRI that maps the diffusion of water molecules in the brain's white matter tracts.[18] This technique reveals brain connectivity and is particularly valuable for studying traumatic brain injury, stroke, multiple sclerosis, and Alzheimer's.[19] By revealing abnormalities that are invisible through conventional MRI or CT scanning, a DTI scan allows researchers to link structural changes with cognitive and behavioral outcomes.[20]

Taken together, these methods illustrate the progression from structural to increasingly sophisticated imaging technologies. While each retains diagnostic significance, modern legal debates often focus on functional modalities, such as an fMRI.

## II. Functional Magnetic Resonance Imaging

Functional MRI builds on structural MRI but shifts the focus from anatomy to activity.[21] By detecting changes in blood oxygenation associated with neural activity—otherwise known as the blood-oxygen-level-dependent ("BOLD") response—an fMRI provides a dynamic map

15. *Id.* at 103-04.
16. *Id.* at 104-05.
17. *See id.* at 105.
18. *Id.* at 105.
19. *See id.* at 105-06; *see also* Henry T. Greely, *Neuroscience, Mindreading, and the Courts: The Example of Pain*, 18 J. Health Care L. & Pol'y 171, 181-82 (2015).
20. *Id.* at 106.
21. *See generally* Emily Morson, *Structural vs. Functional MRI, and Why it Matters*, MOSAIC OF MINDS (Dec. 4, 2024), https://mosaicofmindss.substack.com/p/structural-vs-functional-mri [https://perma.cc/CY6P-4BXM] (explaining that structural MRI shows the "physical structures of [the] brain," whereas functional MRI shows "their amount of activity").

of brain function.[22] Research can track brain activation "across locations, across time, and across tasks. . . . But . . . [it] does not enable [a] reliable conclusion about [what exactly] a person is thinking" or their intentions.[23] While the fMRI occupies a prominent place in neuroscience, its evidentiary role in the law remains contested.[24] The analysis that follows examines two areas where these tensions are most acute: privacy concerns and evidentiary admissibility.

## ANALYSIS

### PART I: Neuroimaging and Privacy

Advancements in neuroscience are rapidly transforming brain imaging from a hospital-based diagnostic tool into a potentially mobile point-of-care technology.[25] As neuroimaging becomes more accessible and integrated into everyday environments, the constitutional and ethical stakes expand exponentially.

#### A. Portable MRIs

Historically, individuals requiring brain scans have relied on hospitals or specialized medical facilities equipped with high-powered MRI machines and the necessary infrastructure.[26] These machines "require[] a large, heavy scanner, powerful magnet, liquid helium for cooling, and a dedicated room with radiofrequency (RF) shielding, sound proofing, and a large power supply."[27] However, the future of neuroimaging may look vastly different.

Driven by advancements in science, artificial intelligence, and technology, researchers are already deploying mobile electroencephalograms ("EEGs") and functional near-infrared

22. JONES, SCHALL & SHEN, *supra* note 6, at 112; *see also* Teneille Brown & Emily Murphy, *Through a Scanner Darkly: Functional Neuroimaging as Evidence of a Criminal Defendant's Past Mental States*, 62 STAN. L. REV. 1119, 1139 (2010) (by detecting the changes with the BOLD response, information about the brain activity can be provided).

23. Owen D. Jones et al., *Brain Imaging for Legal Thinkers: A Guide for the Perplexed*, 2009 STAN. TECH. L. REV. 5, 11, *as reprinted in* JONES, SCHALL & SHEN, *supra* note 6, at 129.

24. JONES, SCHALL & SHEN, *supra* note 6, at 129-131.

25. *Id.* at 115.

26. *Id.*

27. *Id.*

spectroscopy ("fNIRS") scans "into the field, allowing for real-time measurement of brain activity as children learn, athletes play sports, and bikers pedal around the city."[28] While the logistical challenges of portable MRI systems remain formidable, emerging innovations suggest that brain data acquisition may soon bypass the huge machines or the need for a large power supply, paving the way for direct-to-consumer neuroimaging.[29]

This shift holds promise for expanding "research designs and for access to underserved and geographically remote populations," such as small suburbs that typically do not have the resources for an imaging facility.[30] Conducting scans in familiar environments may also enhance the authenticity of experimental findings and decrease the potential for environmental stressors, given that any kind of brain imaging inherently comes with stressors.[31] However, as neuroimaging moves beyond clinical and academic settings, it raises legal and ethical questions about privacy, consent, and data governance.[32]

### B. Privacy Concerns

Mobile neuroimaging technology implicated existing privacy frameworks, particularly the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), which "protects all 'individually identifiable health information' held or transmitted by a 'covered entity' or its 'business associates' in any form or media whether electronic, paper or oral."[33] The scope of protected health information is quite broad, including the following information about:

> [T]he individual's past, present or future physical or mental health or conditions; the provision of health care to the individual; the past, present or future payment of health care; the information that identifies the individual or for which there is a reasonable basis to believe it can be used to identify the individual.[34]

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28. *Id.*
29. *Id.* at 115-16.
30. *Id.* at 115.
31. *Id.*
32. *See* N.Y.C. Bar Ass'n, The Committee on Science & Law, *Are Your Thoughts Your Own?: "Neuroprivacy" and the Legal Implications of Brain Imaging*, 60 REC. 407, 407-08 (2005).
33. *Id.* at 424-25 (quoting 45 C.F.R. § 160.103 (2004)).
34. *Id.* at 425 (quoting 45 C.F.R. § 160.103 (2004)).

Brain imaging, specifically mobile imaging, clearly falls within HIPAA's protective scope.[35] Yet, "there is [minimal] current legislation that appears capable of directly protecting neuroprivacy."[36] Brain scans can expose deeply personal information, ranging from medical conditions to behavioral predispositions, raising profound concerns about the dignity, autonomy, and ownership of cognitive data.[37] Advancements in technology that can interpret brain activity are likely to be "exploited" in other contexts such as "screening job applicants, diagnosing and treating disease, [and] determining who qualifies for disability benefits."[38] The brain has been described as a person's most intimate identity, and its contents should not be weaponized in legal or commercial contexts.[39] While neuroimaging is indispensable in medical diagnostics, its migration into legal proceedings demands a cautious and principled approach.

Although the focus of this Manuscript is on the Federal Rules of Evidence and the implications therein, a question remains on whether neuroimaging is constitutionally admissible. The Fourth Amendment could take the evidence out of court if it is deemed to be procured through an "unreasonable search[] and seizure[]," traditionally understood to apply to physical intrusions into one's body, home, or personal effects.[40] On the other hand, the Fifth Amendment could take the evidence out if the defendant is "compelled in any criminal case to be a witness against himself,"[41] specifically when they are "compelled to make a *[t]estimonial* [c]ommunication that is incriminating."[42] Other work has addressed whether compelled brain scans violate the Fourth and Fifth

35. *See id.* at 427.

36. *Id.*

37. *Id.* at 427-29, 434 ("The idea that people's behavior in a range of areas could be predicted has privacy implications that are even greater than those that arise with genetic information.").

38. *Id.* at 427-28 (internal quotation marks omitted) (quoting Arthur L. Caplan, *Is Better Best?*, 289 SCI. AM. 104, 104 (2003)).

39. *Id.* at 428 ("With the development of 'brain fingerprinting' and other technologies and the progression of research, privacy concerns about neuroscience will only increase.").

40. U.S. CONST. amend. IV ("The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures shall not be violated and no Warrants shall issue, but upon probable cause."). For two cases where the United States Supreme Court recognized a "reasonable expectation of privacy" for compelled tests of a defendant's bodily contents, see Skinner v. Ry. Labor Exec. Ass'n, 489 U.S. 602, 615-18 (1989) and Schmerber v. California, 384 U.S. 757, 766-72 (1966).

41. U.S. CONST. amend. V.

42. Fisher v. United States, 425 U.S. 391, 408 (1976).

Amendments.[43] Nevertheless, privacy concerns may still be relevant and should be incorporated into the mix of evidentiary standards even when there is not a constitutional question.

As Part I has demonstrated, brain data becomes increasingly accessible, and the legal system must confront not only questions of privacy and autonomy but also evidentiary challenges. The existing legal frameworks governing expert testimony, particularly the *Frye* and *Daubert* standards, were not designed to accommodate technologies that probe cognition itself. Part II turns to this structural inadequacy and argues for a tailored evidentiary approach that better reflects the unique risks and complexities that neuroimaging evidence poses in the courtroom.

## PART II: *Daubert*'s Structural Inadequacy and the Case for a "*Neuro-Daubert*" Standard

From an evidentiary standpoint, neuroimaging has been offered in various cases to mitigate punishment, contest mens rea, or, in some instances, as a purported lie-detection tool.[44] In recent years, the use of brain imaging—such as fMRIs, CT scans, PET scans, and EEGs—has raised important questions about its role in the legal system. The opportunity for neuroscience to be used as evidence in criminal trials has increased, allowing it to be used like any other type of evidence to establish or dispute any claim.[45] In fact, "[i]n an analysis of US cases between 2005 and 2012 . . . [it was] reported that 1585 judicial opinions from criminal cases mentioned the defense's use of neuroscientific or genetic evidence."[46] The ability to provide insight into a defendant's mental state or truthfulness, for example, emphasizes the scientific and

43. *See* MARC J. BLITZ, SEARCHING MINDS BY SCANNING BRAINS: NEUROSCIENCE TECHNOLOGY AND CONSTITUTIONAL PRIVACY PROTECTION (Jan C. Bublitz & Jane C. Moriarty eds., 2017), *as reprinted in* JONES, SCHALL & SHEN, *supra* note 6, at 648; *see also* MICHAEL S. PARDO & DENNIS PATTERSON, MINDS, BRAINS, AND LAW: THE CONCEPTUAL FOUNDATIONS OF LAW AND NEUROSCIENCE 150-75 (2013); Nita A. Farahany, *Searching Secrets*, 160 U. PA. L. REV. 1239, 1240 (2012).

44. *See* State v. Andrews, 329 S.W.3d 369, 3884 n.12 (Mo. 2010) (en banc) (Wolff, J., dissenting) (reviewing fMRI research on juvenile brain development); *see also* United States v. Semrau, 693 F.3d 510, 513 (6th Cir. 2012) (defense proposed fMRI results as a lie detection tool); Ent. Software Ass'n v. Granholm, 404 F. Supp. 2d 978, 982 (E.D. Mich. 2005) (reviewing fMRI research on "media violence exposure and brain activation").

45. Darby Aono, Gideon Yaffe & Hedy Kober, *Neuroscientific Evidence in the Courtroom: A Review*, 4 COGNITION RSCH.: PRINCIPLES & IMPLICATIONS, no. 1, 2019, at 1, 3.

46. *Id.*

technological advancements. But even given the potential benefits, brain imaging should not be easily accessible in legal proceedings due to its scientific limitations, potential for misuse, and the threat it poses to legal fairness.

There are two major legal hurdles to fMRI's admissibility in court: the *Frye* and *Daubert* standards. Neuroimaging evidence should not be admitted under existing *Frye* and *Daubert* frameworks because these standards are structurally incapable of addressing the technology that intrudes on cognition itself. Instead, courts should adopt a distinct "*Neuro-Daubert*" standard that incorporates constitutional protections against compelled cognitive exposure, safeguards against juror overreliance on scientific imagery, and addresses evidentiary implications.

### A. The *Frye* Case

The case of *Frye v. United States* was the court's attempt to limit the admissibility of expert witness testimony, and "[t]his rule held sway for seven decades."[47] In *Frye*, the appellant was convicted of second-degree murder and claimed that the lower court erred in dismissing the expert testimony pertaining to his systolic blood pressure deception test results.[48] The court reaffirmed the murder conviction, concluding that for results of any scientific method to be relied upon as evidence in court, the method must first have "general acceptance" within its respective scientific field.[49]

Today, a general acceptance of fMRI studies is lacking within the scientific community. While these scans are widely accepted as evidence of brain damage, strokes, or lesions, fMRI has not been thoroughly researched enough for its ability to depict past mental states in an individual subject.[50] An fMRI scan is only able "to measure levels of brain activity indirectly through changes in . . . blood flow,"[51] but it cannot function as an indicator of whether someone is lying, acting with intent, or perhaps mentally ill. One may argue that brain imaging evidence in the courtroom should be afforded high importance due to the value it can provide regarding claims of brain damage, trauma, or even the development of mental disorders that may influence the behavior of the

47. Jill Lepore, *On Evidence: Proving* Frye *as a Matter of Law, Science, and History*, 124 YALE L.J. 1092, 1096 (2015) ("[*Frye*] remains the standard in several states.").
48. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).
49. *Id.*
50. Brown & Murphy, *supra* note 22, at 1178.
51. JONES, SCHALL & SHEN, *supra* note 6, at 112.

defendant. Even though brain imaging could offer a more comprehensive understanding of a defendant's overall mental state when combined with other evaluations, it does not outweigh the risk involved. For example, it could introduce the risk of a false positive, where the imaging may label someone as dangerous even if there is inconclusive evidence.[52] Lower courts continued to lack clarity on *Frye*, and this landmark case was later overruled by the *Daubert* decision.[53]

### B. The *Daubert* Standard

The *Daubert* standard was established in one of the most important cases concerning the use of science in courtrooms—*Daubert v. Merrell Dow Pharmaceuticals, Inc*.[54] In *Daubert*, the petitioners argued that the district court erred in dismissing expert analysis, which concluded that the prescription drug Bendectin was not a risk factor for human birth defects.[55] The Supreme Court developed a new two-pronged test for admissibility, requiring that all scientific testimony or evidence "rests on a reliable foundation *and* is relevant to the task at hand."[56] Furthermore, the *Daubert* Court held that *Frye* was superseded by Federal Rule of Evidence 702, which governs expert testimony in federal courts.[57] Although the *Daubert* decision became public in 1993, it was not until 2000 when the first amendment to Rule 702 occurred, emphasizing the role of judges as gatekeepers to exclude unreliable expert testimony.[58] Fast forward to 2023, due to the inconsistent application of Rule 702 among the courts, the Judicial Conference Committee on Rules of Practice and Procedure

52. Jarkko Jalava, Stephanie Griffiths & Rasmus Rosenberg Larsen, *How to Keep Unreproducible Neuroimaging Evidence out of Court: A Case Study in fMRI and Psychopathy*, 29 PSYCH. PUB. POL'Y & L. 1, 1 (2023) ("[N]eurosciences are facing a reproducibility crisis as many findings previously considered reliable have come under suspicion of being false positives.").

53. *See* Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 588-89 (1993); *see also* Michael J. Saks, *Judging Admissibility*, 35 J. CORP. L. 135, 139 (2009) (no federal or state court cited *Frye* for at least ten years and during its second quarter-century after publication, it was cited only fifty-four times in federal cases and twenty-nine times in state cases).

54. *See* 509 U.S. at 592-95; *see also* David E. Bernstein, *The Unfinished* Daubert *Revolution*, 10 ENGAGE 35, 35 (2009) ("[T]he emergence of the *Daubert*-702 reliability test for expert testimony is probably the most radical, sudden, and consequential change in the modern history of the law of evidence.").

55. *Daubert*, 509 U.S. at 585-86.

56. *Id.* at 597 (emphasis added).

57. *Id.* at 587-88.

58. *Federal Rule of Evidence 702*, 138 HARV. L. REV. 899, 900 (2025).

approved further amendments.[59] The amended, current Rule 702 states:

> A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if the proponent demonstrates to the court that it is more likely than not that:
>
> (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
>
> (b) the testimony is based on sufficient facts or data;
>
> (c) the testimony is the product of reliable principles and methods; and
>
> (d) the expert's opinion reflects a reliable application of the principles and methods to the facts of the case.[60]

Studies have shown that expert witnesses appear in the majority of trials, with three studies indicating that expert witnesses appear in 86% of cases.[61] In summary, *Daubert* clarified that "general acceptance" is not a necessary "precondition" to the admissibility of scientific evidence under the Federal Rules of Evidence,[62] but "the Supreme Court explained that Rule 702 confers a 'gatekeeping role' on trial judges to 'ensur[e] that an expert's testimony both rests on a reliable foundation and is relevant to the task at hand.'"[63]

This standard has had profound implications for the admissibility of scientific evidence, particularly in emerging fields. For instance, in 2010, a New York state court excluded fMRI expert testimony about a witness's

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59. *Id.* at 901-02.

60. FED. R. EVID. 702.

61. *See* Andrew W. Jurs, *Expert Prevalence, Persuasion and Price: What Trial Participants Really Think About Experts*, 91 IND. L.J. 353, 355 (2016); Shari Seidman Diamond, *How Jurors Deal with Expert Testimony and How Judges Can Help*, 16 J.L. & POL'Y 47, 56 (2007); Samuel R. Gross, *Expert Evidence*, 1991 WIS. L. REV. 1113, 1119 (1991).

62. *Daubert*, 509 U.S. at 594 (explaining that "[w]idespread acceptance can be an important factor in ruling particular evidence admissible").

63. United States v. Semrau*,* 693 F.3d 510, 520 (6th Cir. 2012) (quoting *Daubert*, 509 U.S. at 597); *see also* Michael J. Saks & David L. Faigman, *Expert Evidence After* Daubert, 1 ANN. REV. L. & SOC. SCI. 105, 113 (2005) (requiring the judges to evaluate the research findings and methods supporting expert evidence).

truthfulness,[64] and soon after, a federal court in Tennessee granted the government's motion to exclude fMRI expert testimony.[65] In *Semrau*, the Sixth Circuit applied the *Daubert* framework to assess the admissibility of expert testimony based on fMRI lie detection.[66] The defendant sought to introduce opinion testimony from a doctor who had conducted an fMRI scan to support his claim of innocence.[67] However, the court excluded the evidence, concluding that the technique lacked sufficient scientific reliability under *Daubert* and further noted that the "scan results only show whether someone believes what he is saying at the time of the test rather than what his mental state was at the time of the events discussed."[68] Additionally, expert testimony that has the sole purpose of "vouch[ing] for the credibility of another witness encroaches upon the jury's vital and exclusive function to make credibility determinations, and therefore does not 'assist the trier of fact' as required by Rule 702."[69]

*Semrau* underscores the challenges of applying the *Daubert* standard to novel scientific methods, especially in neuroscience. While the *Daubert* standard was to be viewed as flexible and not a "definitive checklist or test"[70] and the factors offer guidance regarding a large proportion of experts from professional fields, its application in cases like *Semrau* reveals the difficulty of evaluating techniques that fall outside traditional scientific paradigms. This point is further echoed in David L. Faigman and Michael J. Saks's article, *Expert Evidence After Daubert*, arguing that the Court in *Kumho Tire Company v. Carmichael* made no attempt to offer similar criteria or factors "for evaluating experts for whom some or all of the *Daubert* criteria might not be decisive or sufficient."[71] Some examples of these areas include "[a]uto mechanics, historians, accountants, [and] clinical medical doctors."[72]

As neuroscience continues to evolve, the legal system must grapple with how to responsibly integrate such evidence. Even if the usage of neuroscience evidence in the legal field is backed by science and perceived

64. *See* Wilson v. Corestaff Servs., L.P., 900 N.Y.S.2d 639, 642 (2010).
65. *See Semrau*, 693 F.3d at 523.
66. *Id.* at 520.
67. *Id.* at 515.
68. *Id.* at 519-20.
69. United States v. Charley, 189 F.3d 1251, 1267 (10th Cir. 1999) (citing FED. R. EVID. 702 (1975)).
70. Kumho Tire Co. v. Carmichael, 526 U.S. 137, 150 (1999) (internal quotation marks omitted) (quoting Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 593 (1993)).
71. Saks & Faigman, *supra* note 63.
72. *Id.*

to be reliable, there may still be flaws. For example, there have been many legitimate advancements in polygraph testing, fingerprint analysis, and DNA evidence, but studies later revealed that these forms of evidence posed serious risks of reliability and validity.[73] The stakes are high, and errors in scientific evidence can have a profound effect on the outcome of a trial, especially when a defendant's liberty is at risk.

### C. Potential Solution: "*Neuro-Daubert*" Standard

While *Frye* and *Daubert* remain the touchstones for scientific evidence, both fail to assess the unique risk of neuroimaging.[74] *Frye* is too conservative, dismissing new but potentially probative techniques. *Daubert*, by contrast, is too permissive, treating neuroimaging like any other expert science without recognizing its constitutional and cognitive intrusiveness. Courts, therefore, need a third path: the "*Neuro-Daubert*" standard. This framework should demand heightened reliability of both the imaging technology and interpretive methods, incorporate Fourth and Fifth Amendment protections against compelled cognitive exposure, and account for systemic inequalities in access to neuroscientific evidence. Without such a framework, courts risk admitting evidence that is both unreliable and fundamentally unjust.

First, "modifications to the [Federal] Rules of Evidence and clarifications in the instructions to courts would help address the current problem" by providing more specific guidelines for the admission of this neuroscience-based testimony.[75] Courts should be instructed to evaluate not only the validity of the imaging technology itself but also the reliability of the interpretation offered by expert witnesses. Further guidance on the proper criteria for assessing expert testimony in criminal cases can play a profound role in ensuring a fair and impartial court proceeding.[76]

Even if brain scans are eventually admitted to juries on a consistent basis, some may argue that the complexity of these scans raises issues. Jurors are likely not medical doctors and may not "understand the correct applications and limitations of fMRIs as evidence in court" due to its

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73. *See* Brown & Murphy, *supra* note 22, at 1205-06, 1206 nn.324-25.

74. *See* Bernstein, *supra* note 54, at 37-38 ("*Daubert* has not done much to alleviate the problem of forensic science quackspertise," and it "demand[s] resolution before one can conclude that the *Daubert* revolution is complete.").

75. Jim Hilbert, *The Disappointing History of Science in the Courtroom:* Frye*,* Daubert*, and the Ongoing Crisis of "Junk Science" in Criminal Trials*, 71 OKLA. L. REV. 759, 814-15 (2019).

76. *Id.* at 814-15.

"sophistication."[77] Nevertheless, it is still important to consider the advancements in brain-scan technology. For example, scientists are now able to evaluate specific structures, chemical levels, and individual receptors in the brain.[78] Perhaps instead of being a sole determinative factor, the best way to approach the use of neuroscience technology in the legal system is to use it as one factor among others. In other words, neuroscience technology would be a piece of evidence added to the whole puzzle to create a bigger, more comprehensive picture for the factfinders when they are reaching a decision. Neuroscientific data alone may not always be conclusive, but it could be corroborated with litigants' "self-reports" and behavior.[79]

Lastly, because careful consideration is required to determine when using neuroscience evidence is appropriate, it would be beneficial to establish a group to develop rules of evidence to accommodate the technological developments outlined in this Manuscript. Whether it is for the privacy concerns regarding portable MRIs, constitutional concerns, or evidentiary issues in the courtroom, standards and regulations can further public interest and support justice. In fact, the MacArthur Foundation Research Network on Law and Neuroscience currently exists and focuses on using neuroscientific insights to inform legal policy in the criminal law context.[80] A proposed group could include neuroscientists, psychologists, economists, and lawyers, among others, and should be socioeconomically inclusive so that all parts of society are allowed equal input.[81] Policymakers could then propose model laws to accommodate these forms of evidence or offer guidelines for courts interpreting neuroscience evidence in *Daubert* proceedings.[82]

Taken together, these recommendations reflect the necessity for a recalibration of evidentiary standards in light of emerging technology surrounding neuroscience. As neuroimaging continues to evolve in precision and accessibility, so too must the legal standards that govern its use in the legal field. The "*Neuro-Daubert*" standard, as outlined above, offers an approach that integrates doctrinal safeguards with evidentiary reliability and acknowledges the broader implications of cognitive

77. Austin McCullough, *The Possibilities and Perils of Neuroscience in Criminal Law*, 53 AM. CRIM. L. REV. 47, 51 (2017).

78. Greely, *supra* note 19, at 181.

79. *Id.* at 182-83.

80. *See* Homepage, MACARTHUR FOUND. RSCH. NETWORK ON L. & NEUROSCIENCE, http://www.lawneuro.org/ [https://perma.cc/RJT3-GEXU] (last visited Feb. 27, 2026).

81. *Id.*

82. *Id.*

intrusion.

## CONCLUSION

Advancements in neuroimaging hold great potential for enhancing our understanding of the brain and its connection to human behavior, but its use in the legal field must be approached with caution. The portability and increasing accessibility of technology in the field of neuroscience present significant privacy and ethical challenges with minimal legal precedent or regulation directly addressing neural privacy. Furthermore, the sensitive and very intimate data revealed through these scans can be easily misused, especially if individuals are not fully informed or if there is a lack of consent. Brain data must be carefully protected to uphold individual dignity and prevent potential abuse. Stakes are high in criminal proceedings given the nature of these cases and the humane aspect of an individual's life being at stake.

Although neuroscience evidence is becoming more prevalent in the courtroom, its admissibility and interpretation raise serious evidentiary concerns. *Daubert* and *Frye* offer a foundational framework, but they seem to fall short in addressing the nuances of neuroimaging. Ultimately, courts face a choice: fit neuroimaging into ill-suited frameworks, like *Frye* and *Daubert*, or recognize that the technology capable of intruding on cognition requires a distinct evidentiary approach. This Manuscript argues for the latter: the adoption of a "*Neuro-Daubert*" standard. Such a standard would not merely regulate science in the courtroom; it would safeguard the most intimate domain of personhood—the human mind itself. Without it, the legal system risks transforming neuroscience from a tool of understanding into an instrument of injustice.