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Neurobiological evidence and criminal competencies

Tianyi Zhang , Ariana Nesbit, Vivek DattaFirst published: 19 March 2024 | <https://doi.org/10.1002/bsl.2655>

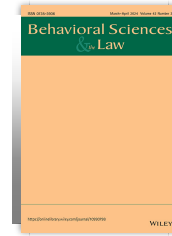
Abstract

Neuroimaging and other neurobiological evidences are increasingly introduced in criminal litigation, especially when a neuropsychiatric disorder is suspected.

Evaluations of criminal competencies are the most common type of criminal forensic assessment in forensic psychiatry and psychology. Given this, it is critical for forensic evaluators to understand how neuropsychiatric disorders may affect a defendant's criminal competencies and how neurobiological data may be used in competency determinations. This paper reviews the use of neurobiological data, particularly neuroimaging, while considering the limitations and potential misuse of such data in criminal competency evaluations.

1 INTRODUCTION

The use of neuroimaging in competency determinations dates back at least to 1970 (Gaudet & Marchant, 2016). The



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earliest published case, *State v. Baldwin* (1970), involved a defendant who was deemed competent to stand trial by state hospital staff after an evaluation that included consideration of his normal electroencephalogram (EEG) and skull x-ray results. After *State v. Baldwin*, newer neuroimaging modalities, capable of yielding more detailed information, were introduced in clinical and forensic contexts. These include structural neuroimaging techniques, such as computed tomography (CT), magnetic resonance imaging (MRI), and functional neuroimaging techniques, such as functional magnetic resonance imaging (fMRI), positron emission tomography (PET), and single photon computer emission tomography (SPECT). A study of reported criminal cases through 2015 that involved the use or attempted use of neuroimaging evidence found that neuroimaging was introduced in the competency phase of 56 reported cases and that neuroimaging was being used with increasing frequency over time (Gaudet & Marchant, 2016).

Another study compiled reported criminal cases between 2005 and 2012 that used neurobiological evidence, which included neuroimaging but was more broadly defined as medical history, neuropsychological testing, neuroimaging, or assertions that the defendant suffered from head injuries. The researchers identified 1585 criminal cases, 15% of which used or attempted to use neurobiological evidence to support a defendant's claim of incompetency. These involved challenges to a defendant's competence to stand trial (77%), competence to plead guilty (12%), competence to waive the right to counsel (9%), and competence to confess (2%). The study also found that in 24% of appellate cases involving neurobiological evidence-based competency claims, the defendant achieved a favorable outcome, meaning either a reversal, remand, or modification, at least in part, of the trial court's decision (Farahany, 2015). In comparison, the national reversal rate for all criminal appellate decisions is 7% in federal courts (United States

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Courts, 2016) and 12% in state courts (Waters et al., 2015). Although causal conclusions cannot be made about how neurobiological data specifically influences appellate case outcomes, it is notable that appellants who introduced such evidence encountered more favorable outcomes than criminal appellants in general.

The existing body of research and case law likely underestimates the use and impact of neurobiological evidence in criminal competency evaluations. Concerns about a defendant's competency are usually addressed pretrial, rarely reach the appellate level, and are therefore seldom published in court opinions. The published cases discussed below offer a restricted but informative view of how neuroscience is being used and evaluated in competency determinations.

2 COMPETENCE TO STAND TRIAL

The minimum standards for competency to stand trial (CST) were set forth by the U.S. Supreme Court in *Dusky v. United States* (1960). In this case, the U.S. Supreme Court asserted that CST requires that a defendant demonstrates a “sufficient present ability to consult with his lawyer with a reasonable degree of rational understanding” and a “rational as well as factual understanding of the proceedings against him” (p. 402). In order to be considered CST, the defendant must possess certain fundamental cognitive abilities, including attention, executive functioning, memory, and language skills (Denney, 2012). For example, a defendant without the necessary expressive language abilities to make thoughts known will be unable to assist an attorney. Similarly, a defendant must have the mental flexibility necessary to make rational decisions with an attorney about legal strategies. Different neuropsychiatric disorders may interfere with these fundamental cognitive abilities, which in turn may impair the individual's CST.

In recent decades, an increasing number of defendants

have claimed incompetence to stand trial (IST) due to neurocognitive disorders. If a competency hearing is held early in the course of the defendant's neurodegenerative disease, the defendant may still be CST. For example, the defendants in *United States v. Bumagin* (2015) and *United States v. Stoller* (2016) were in the early stages of Alzheimer's disease (AD) at the time of their competency hearings. In both cases, the courts concluded the defendants were exaggerating their cognitive deficits and found them to have CST. Given the progressive nature of many neurocognitive disorders, defendants found CST at an earlier stage in their criminal proceedings may subsequently lose the requisite capacities over time, and reevaluation may become necessary.

In *United States v. Rothman* (2010), David Rothman, a 68-year-old physician charged with conspiracy to defraud Medicare, was found CST at a pretrial competency hearing and subsequently convicted. Three months later, his counsel filed a motion to determine competency to proceed to sentencing based on his deteriorating neurocognitive functioning. At the second competency hearing, the Government's expert, a psychologist from the administrative security federal medical center where Mr. Rothman had been observed, concluded he was malingering, based on clinical interview, psychological testing, and staff observations of his behavior. A court-appointed behavioral neurologist and four defense experts, including two treating neurologists, testified on the progression of Mr. Rothman's neurocognitive disorder due to either frontotemporal dementia (FTD) or AD. Unlike most competency hearings, neurologists were heavily represented among the experts in *Rothman*. Their testimony described the disease progression shown on his MRI and PET brain scans, correlated the imaging to his demonstrated cognitive deficits, and explained how such deficits impaired his requisite abilities to be CST.

The clinical interview remains the foundation of competency determinations, but neuroimaging significantly strengthened the testimony of experts who opined Mr. Rothman to be IST. The district court found the court-appointed neurologist to be particularly persuasive but stated that the Government's expert "cannot be credited in this matter" (*United States v. Rothman*, 2010, p. 102), citing reasons that echoed the neurologist's criticism that the Government's psychologist "gave insufficient weight to the findings, primarily based on the PET scan results, that there was a brain disease present... this failure was due to the evaluators' lack of sufficient training in neuropsychology" (p. 47). The court found Mr. Rothman incompetent to proceed to sentencing. *Rothman* reveals the tensions that may emerge when new technologies and more traditional techniques produce conflicting evidence, particularly when these tools fall under the relative domains of expert witnesses of different specialties.

In several appellate cases, neuroimaging played a significant role in demonstrating competency issues that were not properly resolved at earlier stages. In *United States v. Wingo* (2015), Andrew Wingo pled guilty to conspiracy to commit money laundering and received a sentence, despite reports from two psychiatrists and a psychologist describing cognitive impairments that were attributed to his craniosynostosis (a birth defect in which the bones of the skull are prematurely fused). Mr. Wingo appealed and argued that the district court violated his constitutional rights by not ordering a competency hearing sua sponte (on its own motion). The Eleventh Circuit considered reports from the three mental health experts and a radiologist, who described Mr. Wingo's brain MRI as having "stunning" atrophy and his brain SPECT scan as "one of the worst scans [he had] ever seen in [his] life" (p. 1237). The Eleventh Circuit held that the combined evidence of neuroimaging, the expert's opinions, and reports of Mr. Wingo's irrational behavior created reasonable cause to believe he may have

been incompetent and remanded the case for a retrospective competency hearing.

In *United States v. Dreyer* (2013), 73-year-old psychiatrist Joel Dreyer pled guilty to charges related to conspiracy to possess and to distribute controlled substances (Hayasaki, 2015). Three experts diagnosed him with behavioral variant FTD (bvFTD), based on clinical symptoms, neuropsychological testing, and a brain SPECT scan. The experts' reports described various cognitive and behavioral impairments, attributed to bvFTD, but they did not explicitly conclude that Mr. Dreyer was IST. In fact, one of the experts opined he was CST. Mr. Dreyer's attorney did not request a competency hearing, but he explained that Mr. Dreyer would not speak at his sentencing hearing because his bvFTD could cause him to speak in an unregulated manner that would not be helpful to his defense. After Mr. Dreyer was convicted and sentenced, he appealed, contending that the district court erred by not ordering a competency hearing *sua sponte*.

The Ninth Circuit noted no evidence of incompetence directly from Mr. Dreyer, who remained quiet throughout his proceedings, but found his medical diagnosis to have a persuasive effect. His sentence was vacated, and the case was remanded to the district court to hold an evidentiary hearing. The Ninth Circuit distinguished this decision from prior cases in which they concluded there was insufficient evidence, specifically a lack of medical evidence, for a trial court to doubt a defendant's competency. In Mr. Dreyer's case, the court concluded "a clear diagnosis of frontotemporal dementia from multiple sources" and created genuine doubt about his competence (*United States v. Dreyer*, 2013, p. 963). Neuroimaging was important to the success of Mr. Dreyer's appeal because he was able to meet the diagnostic criteria for probable bvFTD, which require brain imaging demonstrating frontal and/or temporal atrophy, hypoperfusion, or hypometabolism (Rascovsky

et al., 2011).

3 COMPETENCE TO PLEAD GUILTY

Defendants may wish to plead guilty in exchange for a lesser sentence or reduced charges. By pleading guilty, they waive their rights to a jury trial, to confront witnesses, and their privilege against self-incrimination. In *Godinez v. Moran* (1993), the Supreme Court rejected the Ninth Circuit's reasoning that competence to plead guilty would require a higher or different standard than competence to stand trial. In evaluations of competence to plead guilty, the forensic evaluator must determine whether the defendant has a mental disorder or defect interfering with his ability to intelligently, knowingly, and voluntarily waive these rights (Noffsinger & Resnick, 2017). Various neuropsychiatric disorders may impair an individual's competence to plead guilty by interfering with certain fundamental cognitive abilities. For example, defendants with frontal lobe deficits may have difficulty retrieving and manipulating the information necessary to weigh the risks and benefits of accepting or rejecting an offered plea bargain (Mossman et al., 2007).

In *Dunlap v. Commonwealth* (2013), Kevin Dunlap was found CST and was later diagnosed with an arteriovenous malformation (AVM) in his right frontal lobe on MRI and PET brain scans. When Mr. Dunlap wished to plead guilty to several capital offenses, his counsel tried to use the imaging results to stay the proceedings and request a new competency evaluation. The trial court did not order a second competency evaluation and accepted Mr. Dunlap's guilty plea. A jury sentenced him to death. Mr. Dunlap appealed, claiming his AVM had impaired his self-control and judgment and rendered him incompetent to plead guilty. The Kentucky Supreme Court held the trial court properly accepted the guilty plea, reasoning that the AVM was likely present when Mr. Dunlap was previously found

CST and that the prior CST finding was proper and supported by substantial clinical evidence.

In *State v. Marshall* (2001), Henry Marshall pled guilty to aggravated first-degree murder. He was informed of the prosecution's intent to seek the death penalty and moved to withdraw his plea on the ground that he had been incompetent to plead guilty. Mr. Marshall introduced a brain MRI scan demonstrating atrophy in the frontal and temporal lobes, abnormal EEG and brain SPECT scan results, and testimony from three experts who offered diagnoses including traumatic brain injury, a mood disorder, and a psychotic disorder. The trial court considered Mr. Marshall's brain atrophy and stated, "it is not clear that this has anything to do with whether or not his plea was competent" (p. 22). The trial court denied his motion to withdraw his guilty plea and did not convene a competency hearing, a decision that was largely based on the court's own observations of him. However, the Washington Supreme Court concluded the trial court erred in denying Mr. Marshall's motion without a competency hearing when presented with substantial evidence from neuroimaging and expert testimony that challenged his competence. The Washington Supreme Court vacated Mr. Marshall's guilty plea and remanded (sent back) the case for further determination.

The above cases (*Wingo*, *Dreyer*, *Dunlap*, and *Marshall*) demonstrate how appellants attempt to use neuroimaging to raise doubts about their competence to stand trial or to plead guilty. In *Dunlap*, the finding of an AVM in the absence of any clearly associated symptoms was insufficient evidence to challenge his competence to plead guilty. Abnormal neuroimaging findings were cited in *Wingo*, *Dreyer*, and *Marshall* as part of the body of evidence, which also included associated symptoms and diagnoses, the totality of which was considered substantial to demonstrate there were competency issues not properly resolved by the

trial courts. However, there is no available subsequent history of *Wingo*, *Dreyer*, and *Marshall*. As such, it is unclear how neuroimaging results and neuropsychiatric diagnoses were considered in competency determinations after the cases were remanded to the trial courts.

4 COMPETENCE TO WAIVE COUNSEL AND TO REPRESENT ONESELF

Defendants are guaranteed the right to counsel by the Sixth Amendment, and they may choose to waive this right in order to represent themselves. In *Faretta v. California* (1975), the U.S. Supreme Court held that the Sixth and Fourteenth Amendments included a constitutional right to proceed without attorney representation if a defendant makes a voluntary and intelligent choice to do so. The U.S. Supreme Court has made a distinction between a defendant's competence to waive his right to counsel and his competence to represent himself. In *Indiana v Edwards* (2008), the Court held that a state may require a higher standard in order for a defendant to engage in self-representation.

The Court did not suggest a standard for competency to represent oneself in *Indiana v. Edwards*. Forensic evaluators may consider whether the defendant is able to discuss their trial strategy, present their legal arguments in an organized manner, and concentrate and cooperate in court. The forensic evaluator should also consider whether the defendant understands his constitutional rights and the consequences of waiving them. Certain fundamental cognitive abilities are required for an individual's competence to waive counsel, and various neuropsychiatric disorders may impair these abilities. For example, the Illinois Supreme Court found the defendant in *People v. Lego* (1995) to be incompetent to represent himself because he had a delusional belief due to a neurocognitive disorder

that his legal skills could rival that of an attorney.

In *United States v. Duncan* (2011), Joseph Duncan pled guilty to three capital murder charges, represented himself in his trial, received a death sentence, and waived his right to appeal. His standby counsel appealed, challenging his competence to represent himself and waive his right to appeal. A defense expert's report noted Mr. Duncan's MRI and PET scans showed “unusual brain structure,” (p. 18) contributing to delusions and an impaired “ability to make rational plans and modulate emotions” (p. 18). Although these vague structural brain abnormalities did not clinically correlate to any diagnosis for which MRI and PET were accepted diagnostic markers, the Ninth Circuit concluded that the totality of the evidence created reasonable doubt about Mr. Duncan's competence. The case was remanded for a retrospective competency hearing, and he was subsequently found to have been competent (Russell, 2013).

5 COMPETENCE TO CONFESS

The Fifth Amendment Awards defends the privilege against self-incrimination. In *Miranda v. Arizona* (1966), the U.S. Supreme Court established that police must advise suspects of their right to remain silent, that anything they say could be used against them in court, and of their right to counsel. *Miranda* waivers must be made voluntarily, knowingly, and intelligently. In *Colorado v. Connelly* (1986), the Court found that coercive police activity is a necessary predicate to finding that a confession is not voluntary. However, police overreaching includes subtle tactics such as applying pressure to a defendant in an impaired mental state—beyond the defendant's ability to resist—in order to obtain a *Miranda* waiver. Certain neuropsychiatric deficits may make defendants significantly more vulnerable to interrogation tactics. For example, a person with AD, who has memory deficits but still retains social skills, may confabulate in order to conceal their cognitive deficits.

There are, to date, no published criminal cases identified that utilized neuroimaging in relation to a defendant's competence to confess.

6 COMPETENCE TO BE EXECUTED

In *Ford v. Wainwright* (1986), the U.S. Supreme Court held that executing an “insane” prisoner violated the Eighth Amendment's prohibition on cruel and unusual punishment. In a concurring but not binding opinion, Justice Powell asserted that the test for competence to be executed is whether the prisoner is aware of his impending execution and the reasons for it. In *Panetti v. Quarterman* (2007), the Fifth Circuit found Scott Panetti to be sufficiently sane for execution based on his factual awareness. However, the U.S. Supreme Court raised the threshold for competency to be executed by reversing and remanding the case with instructions to consider that an impaired rational understanding of the justification for his execution could render Mr. Panetti incompetent.

In the aftermath of *Ford* and *Panetti*, courts have had difficulty determining the appropriate standard for competency to be executed. As the claims of incompetency in both *Ford* and *Panetti* were based on psychotic delusions, some courts questioned whether other mental disorders could impair a person's competency to be executed. In *Madison v. Alabama* (2019), Vernon Madison claimed he could not rationally understand the reasons for his execution because his vascular neurocognitive disorder prevented him from being able to recall his instant offense. His petition asserted that neurocognitive disorders merit the same Eighth Amendment protections, cited the inclusion of neuroimaging in the diagnostic criteria for probable vascular neurocognitive disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), and described MRI scans of Mr. Madison's brain as part of the “evolving landscape of evidence allowing courts to

adequately review maladies that could give rise to incompetence” (Stevenson et al., 2018, p. 35). In *Madison*, the U.S. Supreme Court held that amnesia for the crime did not in itself render a prisoner incompetent to be executed. However, the Court clarified that the scope of *Ford* and *Panetti* was not limited to defendants with psychotic delusions. The Court asserted that the key issue in the competency determination was whether the defendant rationally understood the reasons for his execution and not the specific mental disorder diagnosis.

Prior to *Madison*, claims of incompetency to be executed due to neurocognitive disorders were rare. The Fourth Circuit ruled in *Roach v. Martin* (1985) that the appellant, who possibly carried the genetic variant for Huntington's disease, was competent because he was presymptomatic. In *Miller v. State* (2015), the Florida Supreme Court rejected an appellant's contention that the progressive nature of his frontotemporal lobar degeneration would eventually render him incompetent. They found his claim to be premature because he was currently competent, and an execution warrant was not issued. However, issues of competency to be executed may become more relevant in the future, given the aging of the death row population and increasing percentage of people on death row over the age of 65 (Snell, 2019).

7 LIMITATIONS AND POTENTIAL MISUSE OF NEUROBIOLOGICAL DATA

At the present, professional organizations have not published guidelines or other public stances on the ethical and appropriate use of neuroimaging in criminal competency determinations. The American Academy of Psychiatry and the Law's Practice Guideline for the Forensic Assessment discussed the use of neuroimaging in a broader context of forensic evaluations (Glancy et al., 2015). The

guidelines recognized the appeal of neuroimaging and its appearance of objectivity, while cautioning of its substantial limitations. The guidelines indicated any findings on neuroimaging should be considered alongside the other elements of the forensic assessment, and certain circumstances may require independent verification and/or consultation with a specialized expert.

As the use of neurobiological evidence becomes more prevalent, it is important to recognize the limits of such data given that no neuroimaging abnormality alone equates with incompetence. Forensic experts should recognize that abnormal test results are only useful to the extent that they can be clinically correlated to specific deficits noted on neuropsychiatric examination that may impair a defendant's competence. Defendants who malingering may attempt to exaggerate the clinical significance of incidental findings on structural imaging or functional imaging results that may still be normal when accounting for individual differences.

There are several well-publicized examples of newer neuroimaging technologies being misused in competency determinations. In *Duncan*, vague abnormalities on Mr. Duncan's MRI and PET brain scans were used for forensic purposes beyond their current clinical acceptance. In *United States v. Gigante (1998)*, Vincent Gigante, the alleged head of an organized crime family, claimed he was not competent to be sentenced and attempted to use a PET scan of his brain, showing hypometabolism in the temporal and parietal lobes, as evidence of a neurocognitive disorder. The Government's expert pointed out Mr. Gigante was taking several prescribed psychoactive medications likely to impact the test results, and the interpretation of his PET scan did not reference scans from age-matched control subjects taking similar psychoactive medications. The expert also noted the scan was obtained while Mr. Gigante was engaged in a task, but most dementia studies obtained PET scans in a resting state.

The court considered other evidence that suggested Mr. Gigante had malingered cognitive and psychotic symptoms and concluded, “the brain scans, while properly administered, were of limited utility, were inconsistent with other information, and were unpersuasive in quantifying the degree, if any, of dementia” (*United States v. Gigante*, 1998, p. 20). The court found him competent to proceed to sentencing. *Gigante* demonstrated the limits of neuroimaging's objectivity and the variability in its interpretation. However, this case may have unfairly created an impression that neuroimaging is in itself unreliable. The criticisms in *Gigante* could be more specifically and appropriately directed at the attempted misuse of test results obtained in non-standardized conditions.

Forensic experts should be aware that introducing neurobiological data into the courtroom can elicit a number of reactions. On the one hand, such evidence may be met with skepticism and suspicion; in *Clayton v. Roper* (2008), neurobiological evidence was referred to as “voodoo” and “nice little computer tests” (p. 5–6). On the other hand, courtroom participants might be unduly persuaded by an expert's neuroimages and fail to put this evidence into context. One study of over 1400 potential jurors found they were not unduly persuaded by neuroimaging evidence in a mens rea defense, but whether neuroimaging has a similar effect on competency determinations has not yet been studied (Schweitzer et al., 2011). Given varying attitudes toward neurobiological evidence and disparities in funding across different court systems, some trial courts may be less willing or able to supply the necessary funds for testing.

8 CONCLUSION

Recent trends indicate that neurobiological evidence is increasingly used in the courtroom and that it will likely have a larger role in competency determinations in the future. This is supported by ongoing advances in

neuropsychiatry, both in our understanding of neuropsychiatric disorders and in the technology used to evaluate them. Many individuals may benefit from these developments, which potentially allow for more nuanced evaluations of the disorders that may affect an individual's competency. Recent challenges to competence by criminal defendants have incorporated neurobiological evidence to varying successes. The cases reviewed in this paper demonstrate that neurobiological data is more persuasive when combined with other evidence, such as a defendant's behavior and history, such that the totality of the circumstances supports a claim of incompetence. Neuropsychiatric disorders may impair a number of competence-related behavioral and cognitive abilities, but a neuropsychiatric diagnosis or an abnormal finding in neuroimaging does not equate with incompetence. Therefore, the forensic psychiatrist has the important role of determining whether the defendant's neuropsychiatric symptoms impair the abilities relevant to the specific competence being questioned.

CONFLICT OF INTEREST STATEMENT

None of the authors have any potential conflicts to report.

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