



Another perspective on “neurolaw”: the use of brain imaging in civil litigation regarding mental competence

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ABSTRACT: The hypothesis of a rise of “neurolaw” shall not be accepted as an obvious and universal truth without taking civil cases and civil law into consideration. This article is intended as a contribution to the discussion, analyzing rulings on cases which mentioned MRIs and brain scans as evidence to challenge the validity of civil legal instruments, based on a claim of mental incompetence (also called “insanité”) in France and in the USA. The aim of the study is to test an hypothetical “fascination effect” on judges and to evaluate the true impact in civil jurisprudence of this type of evidence.

KEYWORDS: Brain imaging; mental competence; civil litigation; comparison France/USA

SOMMARIO: 1. Introduction – 2. Admitting brain images as evidence – 3. Evaluating the persuasiveness of brain images – 4. Conclusion.

1. Introduction

In Western countries, genetic science and techniques profoundly modified important branches of criminal and civil law, leading scholars to revise fundamental legal concepts, such “the person”, “parentage”, “proof” and “identity”¹. Now they face potential new disruptions arising from the neurosciences. In the past few decades, progress in neuroimaging has provided new possibilities for visualizing and conceptualizing the anatomy and function of the brain – i.e. the biological substrate for the human “inner self”, “will”, “identity”, “responsibility” and “dignity”. Some legal scholars, dealing with the implications of these new findings and techniques, are outlining the concept of “neurolaw”, forged in the United States² and now spreading all over the world³. This new

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¹ The literature is too abundant to supply a bibliography here. See, G. GUIDICELLI-DELAGE (dir.), *Les transformations de l'administration de la preuve pénale: perspectives comparées (Allemagne, Belgique, Espagne, Etats-Unis, France, Italie, Portugal, Royaume-Uni)*, Paris, 2006; C. LABRUSSE-RIOU, *Ecrits de bioéthique*, Paris, 2007; B. FEUILLET-LIGER, K. ORFALI, G. SCHAMPS (eds), *Protecting the human body: legal and bioethical perspectives from around the world*, Brussels, 2016.

² One of the highest-profile programs in the field is the *Research Network on Law & Neuroscience*, founded in October 2007 with a 10-million-dollar grant from the *John D. and Catherine MacArthur Foundation*. In the intervening decade, the initial project has given rise to variations add secondary or parallel initiatives.



field of research describes transformations in law due to the introduction of brain imaging and the rise of “neuro-determinist” concepts⁴, which seem to be gaining traction. The human being and “neurobiological” individual are one, according to the following reasoning: if human choices and behaviors are cognitive activities, and if the center of cognition is the brain, then the scientific study of the brain is the most appropriate key to revealing relevant analyses of all of our activities. In sum, “I (the subject, person, or individual) am my brain”⁵. In the legal field, this approach takes a variety of forms, from considering brain maturity in determining the criminal liability of a minor⁶ all the way to suggesting the US Constitution be amended to restrict hate speech due to neuroscientific evidence of the damage it does to its targets⁷, and including the use of brain images as proof of mental competence⁸, of responsibility⁹, in lie detection¹⁰, or in assessing dangerousness¹¹. Defense attorneys are increasingly presenting MRIs and brain scans to plead for the irresponsibility of the defendant or lighter sentencing. The argument could be summarized as: “It was not him, Your Honor, it was his brain”¹² or “His brain made him do it!”¹³ This development is a slippery slope, as Stephen J. Morse, in

³ T.M. SPRANGER (ed.), *International Neurolaw: A Comparative Analysis*, New York, 2012.

⁴ P.S. CHURCHLAND, *Braintrust - What Neuroscience Tells Us about Morality*, Princeton, 2012; B. CHAMAK, B. MOUTAUD (dir.), *Neurosciences et société, enjeux des savoirs et pratiques sur le cerveau*, Paris, 2014.

⁵ A. EHRENBERG, *Se définir par son cerveau* in *Esprit*, January 2015, p. 68; D. FOREST, *Neurosepticisme*, Paris 2014; J. ILLES, B.J. SAHAKIAN (ed.), *The Oxford Handbook of Neuroethics*, New-York, 2011, spec. p. 151-226.

⁶ US Supreme Court, *Roper vs. Simmons*, 543 U.S. 551 (2005); J.C. JENNINGS, *Juvenile Justice, Sullivan, and Graham: How the Supreme Court's Decision Will Change the Neuroscience Debate*, in *Duke Law & Technology Review*, vol. 6, 2010, p. 1; M. BARBEE, *Juveniles are Different: Juvenile Life Without Parole After Graham v. Florida*, in *Mississippi Law Journal*, 2011, vol. 81:2, p. 299; P. LARRIEU, *La modulation du droit pénal en fonction de l'âge des personnes*, in O. DROULERS et E. GUISELIN (dir.), *Regards croisés sur l'influence de l'âge en sciences humaines et sociales*, Paris, 2011, p. 97.

⁷ G. MURROW, R. MURROW, *A hypothetical neurological association between dehumanization and human rights abuses*, in *J. Law and Bioscience*, June 2015, p. 336; K.M. NUGENT, *Neuroimaging and the Constitution*, in J.R. SIMPSON (ed.), *Neuroimaging in Forensic Psychiatry. From the clinic to the courtroom*, Oxford, 2012, p. 275.

⁸ N.J. KOLA, J.D. BRODIE, *Application of Neuroimaging in Relationship to Competence to Stand Trial and Insanity*, in J.R. SIMPSON (ed.), *Neuroimaging in Forensic Psychiatry. From the clinic to the courtroom*, op. cit., p. 147; N.A. VINCENT (ed.), *Neuroscience and legal responsibility*, New York, 2013, pp. 25-109.

⁹ M. FREEMAN (ed.), *Law and Neuroscience. Current legal issues vol. 13*, Oxford, 2010; T. BROWN, E. MURPHY, *Through a Scanner Darkly: Functional Neuroimaging as Evidence of a Criminal Defendant's Past Mental States*, in *Stanford Law Review*, Vol. 62, 2010, p. 1119; S.N. MACMILLAN, M.S. VAUGHN, *Weighing the Evidence: Neuroimaging Evidence of Brain Trauma or Disorders in Courts*, in *Criminal Law Bulletin*, Vol. 46, n° 3, May-June 2010, p. 495; C. BYK, *Neurosciences et administration de la preuve pénale devant les juridictions des États-Unis*, in *Médecine & Droit* 2011, n°106, p. 59.

¹⁰ H.T. GREELY, J. ILLES, *Neuroscience-Based Lie Detection: The Urgent Need for Regulation*, in *American Journal of Law & Medicine*, vol. 33, 2007, p. 377; D.P. MCCABE, A.D. CASTEL, M.G. RHODES, *The influence of fMRI lie detection evidence on juror decision-making*, in *Behavioral Sciences & the Law*, Vol. 29, Issue 4, July/August 2011, p. 566.

¹¹ J. WITZEL, *Implications of Neuroimaging for Dangerousness Assessment*, in J.R. SIMPSON (ed.), *Neuroimaging in Forensic Psychiatry. From the clinic to the courtroom*, op. cit., p. 195; E. AHARONI et al., *Neuroprediction of future rearrest*, in *Proceedings of the National Academy of Sciences of the USA*, February 2013, vol. 110 n°15, p. 6223; P. LARRIEU, *Neurosciences et droit pénal. Le cerveau dans le prétoire*, Paris, 2015; G.M. GKOTSI, V. MOULIN, J. GASSER, *Les Neurosciences au Tribunal: de la responsabilité à la dangerosité, enjeux éthiques soulevés par la nouvelle loi française*, in *L'encéphale*, 2015, n° 41, pp. 385-393.

¹² <http://www.leprogres.fr/rhone/2014/06/08/monsieur-le-juge-ce-n-est-pas-lui-c-est-son-cerveau> (last visited 01/11/2017)



particular, has pointed out, coining the expression “Brain Overclaim Syndrome”¹⁴. Many illustrations thereof have been noted in the United States¹⁵, and Europe is not far behind (Italian courts have handed down at least two notable rulings¹⁶). The French situation is as yet unclear. Criminal courts still seem reluctant to allow the introduction of neuroscience findings¹⁷, but in 2011, legislators added a new article 16-14 to the civil code. It accepts and regulates the use of neuroimaging in justice¹⁸. In fact, this legal innovation led commentators to write that France had thereby entered “the age of neurolaw”¹⁹.

The French civil code makes absolutely no distinction between types of neuroimaging, although several techniques exist, falling into two broad categories: those which map the anatomy of the brain, and those which map function. The CAT scan (computed axial tomography), invented in 1971, is based on the use of X-ray data, which is then processed to obtain a three-dimensional representation of the brain. Magnetic Resonance Imagery (MRI) was developed ten years later. It consists of detecting signals emitted by the nuclei of hydrogen atoms in brain tissue when the patient’s head is placed within a powerful magnetic field. The waves are received by antennas and processed in order to construct images. Next, a type of imagery called “functional MRI” or “fMRI” provides data about the parts of the brain which are most active, by mapping the increased flow of oxygenated blood to these areas. Other neuroimaging techniques are also said to be “functional”: for example, the PET scan, using positron emission tomography. In France, the most recent techniques are the ones which have been the focus of jurists’ concern, chiefly to denounce their use in criminal trials. Scholars fear that the police and courts may make disloyal use of this evidence in a variety of different contexts: lie detection, revealing suppressed memories of guilt, or predicting dangerousness²⁰. The French na-

<https://www.corsematin.com/article/corse/pietrosella-un-resultat-dirm-qui-pese-sur-la-poursuite-de-cette-affaire.9172.html> (last visited 01/11/2017).

¹³ H.T. GREELY, *Neuroscience and Criminal Responsibility: Proving ‘Can’t Help Himself’ as a Narrow Bar to Criminal Liability*, in M. FREEMAN (ed.), *Law and Neuroscience. Current legal issues vol. 13*, Oxford, 2010, p. 61; E. J. STERNBERG, *My Brain Made Me Do It: The Rise of Neuroscience and the Threat to Moral Responsibility*, New-York, 2010; I. YURKIEWICZ, “My Brain Made Me Do It”: Can Neuroimaging Undermine the Case for Criminal Punishment?, in *Penn Bioethics Journal*, Fall 2010, vol. 6, Issue 2, p. 14.

¹⁴ S.J. MORSE, *Brain overclaim syndrome and criminal responsibility: A diagnostic note*, in *Ohio State Journal of Criminal Law*, 2006, Vol. 3, p. 397.

¹⁵ N. FARAHANI, *Neuroscience and Behavioral Genetics in US Criminal Law: An Empirical Analysis*, in *Journal of Law & the Biosciences*, 2016, vol. 2, p. 485, cites over 250 cases in 2012, in which “neurobiological” evidence was introduced for the purposes of legal defense.

¹⁶ E. FERESIN, *Italian court reduces murder sentence based on neuroimaging data*, in *Nature News Blog*, Sept. 2011: http://blogs.nature.com/news/2011/09/italian_court_reduces_murder_s.html (last visited 01/11/2017).

¹⁷ L. PIGNATEL, V. GENEVES, *Etat de l’art “Droit et Neurosciences,” Rapport de recherche pour la Mission de recherche Droit & Justice*, 2016, pp. 63-54.

¹⁸ Loi de bioéthique n° 2011-814 du 7 juillet 2011, article 45.

¹⁹ *Le cerveau et la loi: éthique et pratique du neurodroit*, Note d’analyse du Centre d’analyse stratégique, septembre 2012, n° 282; See also O. OULLIER (coord.), *Le cerveau et la loi. Analyse de l’émergence du neurodroit*, Document de travail n° 2012-07, Centre d’analyse stratégique, septembre 2012.

²⁰Cf., in particular: H. GAUMONT-PRAT, *La loi du 7 juillet 2011 relative à la bioéthique et l’encadrement des neurosciences*, in *Les petites affiches*, novembre 2011 n° 231, p. 10; C. BYK, *Les neurosciences: une contribution à l’identité individuelle ou au contrôle social ?*, in *Revue de droit sanitaire et social* 2012, n° 5, p. 800; P. LARRIEU, *Le droit à l’ère des neurosciences*, in *Médecine & Droit*, 2012, p. 106; G. CASILE-HUGUES, *La responsabilité pénale à la lumière des neurosciences*, in *Revue pénitentiaire et de droit pénal*, 2012, n° 1, p. 9; P. LARRIEU, B. ROULLET,



tional advisory committee on ethics (Comité Consultatif National d'Éthique), has pointed out the risk of over-interpretation of neuroscience findings and the danger that judges will trust the imagery more than their own critical sense²¹. The French Parliamentary Office on the Evaluation of Scientific and Technological Choices (Office Parlementaire d'Évaluation des Choix Scientifiques et Technologiques) has also issued warnings²². In the United States, the use of functional imagery techniques as evidence has also elicited much commentary, notably a ruling specifically in the field of the admissibility of evidence (*United States v. Semrau* 2012). However, the importance of anatomical neuroimaging has not been neglected: the literature shows that brain anatomy imaging is increasingly used by the justice system, and that interpretation of the findings can elicit lengthy discussion²³. Certain cases, abundantly considered and commented on, have pioneered the "neurolaw" field. For example, the *Weinstein* case²⁴ shed light on the impact of images showing neurological anomalies on the construction of a plea of insanity; i.e. whether these images constituted evidence that the defendant's judgment was impaired. In France, as in the USA, neither the text of the law nor the subject of litigation justified singular focus on functional imagery. Anatomical imagery also requires interpretation which is not exempt from discussion. It might be an error to allow routine acceptance of neuroimaging as evidence without questioning its interpretation, under the pretext that the images are purely descriptive of the brain at a given moment. It is true that functional imagery demands more technical intervention, and produces a more elaborate result, which is more subject to misinterpretation. However, it must be noted that all neuroimaging techniques are based on a reconstruction of the data, and all of the interpretations inferred from this data are likely to have an impact on the lives of those entering legal pleas. Therefore, it is still necessary to examine the use of anatomical imagery in justice.

The legal literature has also focused almost exclusively on criminal law, which is undeniably central to issues of human rights. Nevertheless, it is unfortunate to neglect civil law when investigating a question like the modification of the will and the mental state of the person. On this point, civil law cannot be ignored. Several types of litigation can be explored; particularly, the recognition and proof of

C. GAVAGHAN (dir.), *Neurolex sed...dura-lex. L'impact des neurosciences sur les disciplines juridiques et les autres sciences humaines: études comparées*, Wellington, 2013; M.-C. SORDINO, *Le procès pénal confronté aux neurosciences: science sans conscience... ?*, in *Actualité Juridique Pénal* 2014, p. 58.

²¹ CCNE, Avis n° 116, *Enjeux éthiques de la neuroimagerie fonctionnelle*, 23 février 2012: <http://www.ccne-ethique.fr/fr/publications/enjeux-ethiques-de-la-neuroimagerie-fonctionnelle#.WYGcYg182w> (last visited 01/11/2917)

²² OPECST, *L'impact et les enjeux des nouvelles technologies d'exploration et de thérapie du cerveau*, Synthèse du rapport d'A. CLAEYS Et J.-S. VIALATTE, députés, mars 2012: <http://www.senat.fr/notice-rapport/2011/r11-476-1-notice.html> (last visited 01/11/2917)

²³ J. DUMIT, *Picturing Personhood. Brain scans and Biomedical Identity*, Princeton, 2004, pp. 109-127; O. JONES, J.D. SCHALL, F.X. SHEN, *Law and Neuroscience*, New-York, 2014.

²⁴ J. ROSEN, *The Brain on the Stand in The New York Times Magazine*, March 11, 2007; K. DAVIS, *Brain Trials: Neuroscience Is Taking a Stand in the Courtroom*, in *American Bar Association Journal*, Nov. 2012: http://www.abajournal.com/magazine/article/brain_trials_neuroscience_is_taking_a_stand_in_the_courtroom/ (last visited 01/11/2917). For other examples: *United States vs. John W. Hinckley, Jr.* (1982: CT Scan to support the defense plea of irresponsibility for the attempt to assassinate Ronald Reagan); *South Carolina vs. Stanko* (2006: PET presented to the judge and accepted as evidence proving the defense plea of diminished capacity in a trial for murders and rape).



compensable damages (especially chronic pain and mental trauma); the civil liability of a person being treated with a prescription drug which causes behavioral modifications; the proof that a person was not mentally competent to give valid consent, etc. Furthermore, examining criminal procedures alone would not suffice to lift or to confirm fears about excessive confidence in the unequivocal nature of brain images, or regarding a possible “fascination effect”²⁵. When the French Parliamentary Office on Evaluating Scientific and Technological Choices warns of the “power of simplification and fascination of images [which] may make them overly compelling, and confer upon them evidentiary power that is greater than what they can provide”²⁶ the field of civil law is also concerned. When Owen D. Jones and his co-authors express a will to enable judges to use neuroimaging wisely (“we are concerned that brain imaging can be misused by lawyers (intentionally or unintentionally) and misunderstood by judges and jurors”²⁷), civil cases must also be considered. Yet, although most of the literature asserts that the use of brain imaging is common in civil cases, we are forced to observe that studies investigating civil jurisprudence are rare.²⁸ It appears to be indispensable to investigate current judicial practices in the field of civil law. As Amedeo Santosuosso notes, regarding the evaluation of chronic pain, “it might be worthless going on wondering how and if neuroscientific findings change our idea of law and responsibility without having enough information about their real impact”²⁹. A few rulings have been reported in literature on cases in the United States³⁰. So far, no French study has been published. Hence, in their state of the art essay on Law and Neuroscience in

²⁵ These fears are mainly fed by two studies in cognitive sciences: D.P. MCCABE, A.D. CASTEL, *Seeing is believing: the effect of brain images on judgments of scientific reasoning*, in *Cognition* 2008 Apr., vol. 107(1), p. 343; D.S. WEISBERG et al., *The Seductive Allure of Neuroscience Explanations*, in *Journal of Cognitive Neuroscience* 2008 Mar., vol. 20(3), p. 470. Other studies have reached the opposite conclusion: M.J. FARAH, C.J. HOOK, *The seductive allure of “seductive allure”*, in *Perspectives in Psychological Science*, 2013, vol. 8, p. 88. Nevertheless, it seems unwise to allow the cognitive sciences and neurosciences to monopolize studies of the impact of a type of evidence. Studies based on the grounds for legal decisions are necessary as well.

²⁶ OPECST, *L’impact et les enjeux des nouvelles technologies d’exploration et de thérapie du cerveau*, op. cit.

²⁷ O.D. JONES, J.W. BUCKHOLTZ, J.D. SCHALL, R. MAROIS, *Brain Imaging for Judges: An Introduction to Law and Neuroscience*, in *Court Review* 2014, vol. 50, p. 44, quotation p. 45. An earlier study: O.D. JONES, J.W. BUCKHOLTZ, J.D. SCHALL, R. MAROIS, *Brain Imaging for Legal Thinkers: A Guide for the Perplexed*, in *Stanford Technology Law Review* 2009, vol. 5: <https://ssrn.com/abstract=1563612> (last visited 01/11/2017)

²⁸ L. CLAYDON, P. CATLEY, *Neuroscientific Evidence in the English Courts*, in T.M. SPRANGER (ed.), *International Neurolaw. A comparative analysis*, op. cit., p. 305, spéc. pp. 317-325; C.H. DE KOGEL, W.M. SCHRAMA, M. SMIT, *Civil Law and Neuroscience*, in *Psychiatry, Psychology and Law (Journal of the Australian and New Zealand Association of Psychiatry)*, 2014, vol. 21, n 2, p. 272; C.T. LIU, *Scanning the Evidence: The Evidentiary Admissibility of Expert Witness Testimony on MRI Brain Scans in Civil Cases in the Post-Daubert Era*, in *New York University Annual Survey of American Law*, 2015, vol. 70, p. 479. Adde R.P. GRANACHER, *Commentary: Applications of Functional Neuroimaging to Civil Litigation of Mild Traumatic Brain Injury*, in *Journal of the American Academy of Psychiatry and the Law*, September 2008, 36 (3) p. 323.

²⁹ A. SANTOSUOSSO, *Neuroscience and converging technologies in Italy: From free will approach to humans as not disconnected entities*, in T.M. SPRANGER (ed.), *International Neurolaw. A comparative analysis*, op. cit., p. 197.

³⁰ J.D. ARONSON, *The Law’s Use of Brain Evidence*, in *Annual Review of Law and Social Science*, 2010, Vol. 6, p. 93; O.D. JONES, F.X. SHEN, *Law and Neuroscience in the United States*, in T.M. SPRANGER (ed.), *International Neurolaw: A comparative Analysis*, op. cit., p. 351; O. JONES, J.D. SCHALL, F.X. SHEN, *Law and Neuroscience*, op. cit., pp. 10-13; C.T. LIU, *Scanning the Evidence: The Evidentiary Admissibility of Expert Witness Testimony on MRI Brain Scans in Civil Cases in the Post-Daubert Era*, cit., p. 480.



France and the US, Laura Pignatel and Victor Genevès concluded that the “civil trial [is] invisible”³¹. The fact that French civil cases are more easily accessible to researchers than criminal trial records makes this situation all the more regrettable. The gap can and must be filled.

This article is intended as a contribution to the discussion, analyzing rulings on cases which mentioned MRIs and brain scans as evidence to challenge the validity of civil legal instruments, based on a claim of mental incompetence (also called “insanité”³²). There are several reasons for this choice. First, this issue is at the crossroads between law of obligations (since it involves nullifying legal acts) and individual civil rights (since it also concerns determinations of legal incompetence or mental disorders altering the will). Secondly, from a quantitative perspective, it is the second most important field of litigation as regards the use of brain images as evidence, after civil liability lawsuit (compensation for the victims of physical or mental trauma)³³. Moreover, this type of litigation offers interesting elements: it often requires a discussion of imagery from the scanner or MRI, because either party is trying to draw an interpretation supporting its claims. In this context, the medical and scientific data is likely to be weighed against other information, such as testimony regarding the person’s behavior and social interactions. Hence, civil rulings concerning requests that a legal act be nullified on the basis of mental incompetence are a source of knowledge on the real impact of neuroimaging in the decision-making process.

From a methodological viewpoint, the work involves systematic extraction from jurisprudential databases and analysis of the rulings collected³⁴. For material reasons, this could be carried out in only one geographical area. As a result, the data relate mainly to France. Between 2007 and 2016, of 689 rulings from courts of appeal and the Cour de Cassation mentioning a brain scan or MRI, we have selected 77 decisions in civil cases which involved the determination of mental competence and the impact of a change in mental faculties on the engagement of the will. However, a comparison is useful, in order to highlight any specificities of French law or international convergences on the subject. We have chosen a comparison with United States law, because US courts have pioneered this question. Procedural differences distinguish each judicial order. Hence, the first observation will involve the admissibility and introduction of brain imagery as evidence in the legal process. Procedural divergences appear to be compatible with a convergence of motivational approach (2). The second set of findings is related to the judges’ use of their freedom of evaluation. In a majority of cases, the magistrates’ independence of judgment seems to be intact. They are maintaining the ability to weigh brain imaging data against other forms of evidence. However, there is some question as to whether this balance will last (3).

³¹ L. PIGNATEL, V. GENEVES, *Etat de l’art “Droit et Neurosciences”*, op. cit., p. 26.

³² A French expression specific to civil matters, not identical to *insanity* in US criminal law. In this case, the operative concept is *mental incapacity* or *mental incompetence*.

³³ Also in this sense for Great Britain and the Netherlands: L. CLAYDON, P. CATLEY, *Neuroscientific Evidence in the English Courts*, cit., p. 306; C.H. DE KOGEL, W.M. SCHRAMA, M. SMIT, *Civil Law and Neuroscience*, cit., p. 274.

³⁴ This study was based on a search through two databases: Legifrance for Cassation Court and JuriCA for Appellate Court rulings, both said to be complete for the decisions reviewed, over a period stretching from January 1, 2007 and December 31, 2016. The following key words were searched: «MRI», «scanner», «cerebral».



2. Admitting brain images as evidence

To understand how neuroimaging arrives in a courtroom, one must first be aware of certain contextual elements: first, procedural rules regarding the admissibility of evidence; and second, rules specific to litigation challenging the validity of legal acts due to impaired mental capacity. It is noteworthy that the US and French systems diverge significantly in relation to the admissibility of evidence. French jurisprudence contains nothing comparable to US Supreme Court rulings on the admissibility of scientific evidence or expert testimony. Indeed, in the United States, the 1923 *Frye*³⁵ ruling, which paved the way for the *Daubert*³⁶ decision in 1993, pioneered the investigation of what constitutes admissible evidence by the jurisdictions themselves. Evidence that passes the test possesses a certain authority. If brain scans (anatomical or functional) are introduced in support of a claim, their very admission can be interpreted as a form of recognition and even validation³⁷. Christina T. Liu cites several cases where anatomical images of the brain were admitted in civil litigation, whereas fMRI scans were barred, because they failed to meet requirements established by the *Daubert* ruling³⁸. In the 2012 case of *U.S. v. Semrau*, the defense introduced an fMRI as proof that the defendant was “generally truthful”³⁹. The judges observed that the interpretation suggested was anything but the result of scientific consensus. This observation seems to apply not only to fMRI, but to other techniques and their interpretation⁴⁰. For the moment, the stumbling block arises from doubts about the relevance of laboratory data to a complex “real world” situation. Regardless of the solution adopted – acceptance of some anatomical brain scans, rejection of other types of imagery –, the evidence-admissibility procedure advised by the *Daubert standard* is a remarkable tool for reinforcing the independence of the court’s judgment. But, as noted before, there is no such test in French law. Unlike an American judge, the French judge plays no role as an “evidentiary gatekeeper”⁴¹, with the power to certify the scientific validity of the findings and their admissibility to the court. In France, except

³⁵ *Frye v. United States*. 293 F. 1013 (D.C. Cir. 1923).

³⁶ *Daubert v. Merrell Dow Pharmaceuticals Inc*, 509 U.S. 579 (1993). Some courts continue to refer to the *Frye* decision as defining “the predominant standard for determining the admissibility of expert evidence.” Currently, the majority have adopted the criteria established by the *Daubert* ruling and refined in later decisions (not. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999), which broadens the field of application of the “Daubert test” to all expert testimony).

³⁷ E. BEECHER-MONAS, E. GARCIA-RILL, *The Law and the Brain: Judging Scientific Evidence of Intent*, in *The Journal of Appellate Practice And Process*, 1999, Vol. 1, Issue 2, article 4, p. 243; O.D. JONES, J.W. BUCKHOLTZ, J.D. SCHALL, R. MAROIS, *Brain Imaging for Legal Thinkers: A Guide for the Perplexed*, cit., p. 46.

³⁸ C.T. LIU, *Scanning the Evidence: The Evidentiary Admissibility of Expert Witness Testimony on MRI Brain Scans in Civil Cases in the Post-Daubert Era*, cit., p. 480.

³⁹ *United States v. Semrau*, N° 11-5396 (6th Cir. 2012). N. FEIGENSON, *Brain Imaging and Courtroom Evidence: On the admissibility and Persuasiveness of fMRI*, in *International Journal of Law in Context*, Volume 2, Issue 3 September 2006, p. 233.

⁴⁰ PET scan: *United States v. Mezvinsky* (2002) 206. F.Supp. 2d 661, 674 (ED Pa 2002); SPECT scan: *People v. Ford* (2005) WL 236487 (Cal. Ct. App 2005). For other examples, see J.G. EDERSHEIM, R. WEINTRAUB BRENDEL, B.H. PRICE, *Neuroimaging, Diminished Capacity and Mitigation*, In J.R. SIMPSON, *Neuroimaging in Forensic Psychiatry. From the clinic to the courtroom*, op. cit., p. 163. Adde R.P. GRANACHER, *Commentary: Applications of Functional Neuroimaging to Civil Litigation of Mild Traumatic Brain Injury*, cit., p. 325.

⁴¹ E. BEECHER-MONAS, E. GARCIA-RILL, *The Law and the Brain: Judging Scientific Evidence of Intent*, cit., p. 245; J.G. EDERSHEIM, R. WEINTRAUB BRENDEL, B.H. PRICE, *Neuroimaging, Diminished Capacity and Mitigation*, cit., p. 165.



when specific rules limit the types of admissible proof (in contract law or family law, for instance), any evidence likely to substantiate the claims of either party is admissible. However, procedural rules require a contradictory debate for each piece of evidence. The judge subsequently evaluates the strength of conviction of these elements of proof, observing adversary procedure and being careful to answer all of the parties' conclusions (and not denature the deed). In other words, proof is reached "by all means", and each judge has the power to evaluate its relevance to the case he has been asked to examine⁴². For lack of a *Daubert standard* applicable to all pleas, judges evaluate the testimony of scientific experts on a case-by-case basis. Our study shows that they have been more likely to admit evidence from brain scans than from graphological analysis, for example. Graphological evidence is taken into consideration,⁴³ but it has been criticized by judges as being "imprecise and doubtful"⁴⁴ or "lacking in objectivity"⁴⁵. No such remarks have been recorded in decisions reached with the contribution of the results of brain imaging.

Admissibility according to *Daubert criteria* is not the only lens used to evaluate evidence in the United States. Owen D. Jones and his co-authors note that "It is important to remember that the admissibility of brain images is not simply a matter of whether they are scientifically sound. The potential relevance and hence admissibility of brain images will vary according to the specific legal issue at hand [...]. Put another way, the admissibility of brain images depends largely on their perceived potential relevance (if any) to the issue to be determined, independent of (and often before) considering the quality and interpretation of the specific images themselves"⁴⁶. Any deed, contract, or donation needs an authentic will to be valid, which exists only if the signatory, the contracting person, or the donor is "of sound mind"⁴⁷. However, evidence of the person's mental competence is not based on the same rules as those of the existence of the deed (which must above all be proved in writing, and sometimes notarized as genuine). In the United States, types of admissible evidence for determination of mental state may vary from one state to another, but it seems that testimony and scientific expertise are the most common⁴⁸. It is the same in France, but since 2011, a specific item of law has referred to brain images as evidence. Article 16-14 of the French Civil Code states that "Cerebral imaging shall be used only for the purposes of medical diagnosis, scientific research, or within the context of judicial expertise. The explicit consent of the person must be given in writing prior to the examination, after he or she has been duly informed of its nature and purpose. Consent must mention the purpose of the examination, and can be revoked at any time and in any form". This text es-

⁴² See, in particular, Civ.1, 7 novembre 2012, n° 11-24.645; Civ.1, 19 décembre 2012, n° 11-26.340; Civ.1, 15 mai 2013, n° 12-14.733.

⁴³ Cour d'appel de Lyon, 29 mars 2016, n° 14/05309; Cour d'appel d'Aix-en-Provence, 25 mai 2016, n° 14/23598

⁴⁴ Cour d'appel de Chambéry, 20 mars 2012, n° 11/00245. See also : Cour d'appel de Versailles, 06 décembre 2012, n° 11/00616.

⁴⁵ Cour d'appel de Limoges, 20 juin 2013, n° 12/00379.

⁴⁶ O.D. JONES, J.W. BUCKHOLTZ, J.D. SCHALL, R. MAROIS, *Brain Imaging for Judges: An Introduction to Law and Neuroscience*, cit., p. 47.

⁴⁷ It is a classic legal solution. In French law: Code civil, formerly article 489-1, then articles 414-1 and 901, and henceforth article 1129 of the Code Civil.

⁴⁸ For instance, Indiana law permitted sanity to be proved by either expert or lay testimony: see *Moore v. Duckworth* 443 U.S. 713 (1979), cited in E. BEECHER-MONAS, E. GARCIA-RILL, *The Law and the Brain: Judging Scientific Evidence of Intent*, cit., p. 246.



establishes no prerequisites other than prior informed consent. Therefore, the principles of civil procedure continue to apply, and proof of altered mental faculties can be made “by any means”. Our study shows that, usually, the parties submit brain scans carried out for medical reasons prior to the litigation of the deed. Most of the time, the judge appoints a judicial expert – that is, an expert in medical treatments and imagery – to analyze the scans and the findings previously derived from them by the prescribing physicians. In France, forensic expertise (in both civil and criminal affairs) is dedicated to the judge’s assistance in ruling on the mental competence of the donor or the contracting person. Hence, the judicial expert is not employed by either party; instead, he is an auxiliary to the court⁴⁹. As a result, he is presumed to write a report independent of either party’s interest. Nevertheless, the judge is not bound by the expert conclusion; as long as he provides grounds for his decision, he is free to evaluate the facts according to applicable law. The adversarial principle requires that the parties be able to discuss the conditions under which the judicial expertise was carried out and the findings derived from it, as well as all of the pieces of evidence pertaining to the case⁵⁰. On these grounds, and in the name of the right of defense, the parties may not only debate the way the brain scans should be interpreted; they may also produce testimony from other experts (who are known as “experts of the party,” rather than “experts of the court”) or solicit a complementary expert report or a judicial counter-expertise.

In both France and the United States, it is up to the party challenging the validity of a legal act to prove that the person was not capable of understanding its meaning and consequences. In other words, the plaintiff must prove that the person’s judgment had either disappeared or was so confused that it was impossible for him or her to express a *real* will.⁵¹ Judges must evaluate mental competence *at the time of formation* of the will, the donation, or the contract.⁵² One party may also try to prove, by any means, the existence of “an unusual instant of lucidity”, which may have occurred during a period of mental incompetence. This procedure is therefore distinct from the one aimed at establishing “protected adult” status (guardianship, curatorship, ward of the court), dedicated to organizing the life of persons whose mental faculties have legally been determined to be too severely impaired for them to look after their own interests. In the context of our study, two questions have been formulated. First, what kind of evidence convinces the judge when he or she is determining whether a person who consented to a donation, or signed a deed a will, was capable of understanding the meaning and implications of the act? Secondly, if a brain scan or MRI is produced, indicating an anomaly of the brain, the beginning of degeneration, or early signs of Alzheimer’s disease, is it decisive?

⁴⁹ For a comparison of expert testimony in the United States and in France: W.R. BAKER, *L’expertise comparée - Les Etats Unis et la France*, in *La revue Experts* n° 43, 06/1999: <http://www.revue-experts.com/l-expertise-comparee-les-etats-unis-et-la-france.html> (last visited 01/11/2017).

⁵⁰ European solution: European Court of Human Rights, *Mantovanelli v. France*, March 18, 1997, n° 21497/93.

⁵¹ *Harper v. Watkins*, 670 S.W.2d 611 (Tenn.Ct.App.1983): «The burden in a will contest is always on the one who alleges an unsound mind to prove it”.

⁵² *American Trust & Banking Co. v. Williams*, 32 Tenn. App. 592, 225 S.W.2d 79 ([Tenn.App.] 1948): The burden of proof requires a contestant to produce evidence from which the jury could infer that the testator, at the very time of executing the will, did not know and understand the force and consequences of his act.



At this point, one remarkable conclusion of our study is that the differences in procedure noted above – the absence, in France, of any equivalent of the *Daubert standard*, and prevalence of judicial experts (expert witnesses are only rarely appointed by the parties) – do not result in significant and visible divergences in the reasoning and motivation adopted by the judges. Most of the time, their rulings reveal no “fascination” for brain images. Scans and MRIs are important clues, but just clues among others. In France, our results show that judges review a variety of indications and sources of information. For instance, these sources include: the clarity of the language (in the deed), the fairness of the provisions, the predictability of a donation, gift, or other bequest; a variety of medical certificates; a graphological analysis, in some cases; testimony as to whether family or personal relations had degraded; re-enactment of the daily activities of the person whose mental competence is being evaluated, etc. It is true that, more and more frequently, brain scans are submitted to the court,⁵³ accompanied by an interpretation tending sometimes to demonstrate disorders (when an anomaly or abnormality is detected), or sometimes to demonstrate the absence of a disorder (when the scan does not show any notable particularity⁵⁴). As a result, judges’ decisions refer to them. For example, the Rouen Court of Appeals, examining the brain scan of a Ms. X whose will was contested, described it as belonging to “relevant medical and legal items” which, “considering the date on which the will was written, lead the court to believe that Ms. X was mentally incompetent when she wrote the will, unless the respondent, who is the beneficiary of the will, can establish that her mother was experiencing an unusual period of lucidity when the will was made”⁵⁵. However, the brain scan was not the only convincing element: it was just an important piece of the puzzle. In the United States, the *Van Middlesworth*⁵⁶ case provides an illustration of similar motivation. The Michigan Court of Appeals was asked to overturn a lower-court ruling that a man who signed a contract for the sale of his land had done so when he was not mentally competent to understand the meaning and consequences of the contract. The appellate court took care to refer to all evidence and testimony tending to show that the seller was mentally incompetent. They heard testimony from a physician, a psychologist, a neurologist, and a geriatrics specialist, and reviewed the results of an MRI. But, considering this evidence as only part of the picture, they did not make it their fundamental grounds. For example, they wrote: “Additionally, the trial court placed reliance on the fact that three of the four expert witnesses testified to Piper’s deteriorated mental state. [...] The second witness, a neurologist, examined the results of Piper’s magnetic resonance imaging (MRI), found evidence of brain shrinkage and hardening of the arteries, and opined that the MRI was consistent with dementia both at the time of the MRI and in March 1995 [when the contract was made]. The third expert witness, a physi-

⁵³ The court ruling databases we consulted show a clear increase in the number of cases in which an MRI or brain scan was mentioned. Over a ten-year period from 2007 to 2016, the rate of submission doubled between July 2011 and December 2016, in a survey covering all of French territory.

⁵⁴ See, for example: Cour d’appel de Versailles, 6 décembre 2012, n° 11/00616; Cour d’appel de Caen, 9 avril 2013, n° 11/00454.

⁵⁵ Cour d’appel de Rouen, 13 octobre 2010, n° 09/04350. *For other examples* : Cour d’appel d’Aix-en-Provence (1^{re}, A), 18 janvier 2011, n° 09/19988; Cour d’appel de Poitiers, 16 mars 2011, n° 10/00175; Cour d’appel d’Aix-en-Provence, 28 juin 2011, n° 10/13070; Cour d’appel de Chambéry, 20 mars 2012, n° 11/00245; Cour d’appel de Montpellier, 18 octobre 2012, n° 12/00520; Cour d’appel d’Aix-en-Provence, 20 novembre 2014, n° 13/21234; Cour d’appel d’Aix-en-Provence, 25 mai 2016, n° 14/23598.

⁵⁶ *Van Middlesworth v. Century Bank & Trust Co.*, n° 215512, 2000 WL 33421451 (Mich.Ct. App. May 5, 2000).



cian specializing in geriatric neurology, concluded that Piper suffered from a combination of Alzheimer’s disease and multi-infarct dementia, and that Piper was mentally incompetent at the time of examination as well as in March 1995. Although plaintiffs presented a psychiatric expert witness of their own who came to a contrary conclusion, we give much weight to the opinion of the trial judge who was in the best position to consider and evaluate the testimony of these witnesses”. Although the brain scan reinforced the conviction of the judges in their decision, it was at neither the source of their conviction, nor the center of their motivation (as the adverb *additionally* shows).

However, certain experts have no qualms about claiming their interpretations are infallible in order to influence the judge’s evaluation of the evidence. This assertion can be illustrated by a French case in which a petitioner wished to have the judge recognize the nullification of a donation, claiming that when she signed the document, she was in an excessively troubled mental state, suffering from neuropsychological disorders which had justified the use of brain scans and EEGs. Several primary care physicians had testified, and several medical experts, both judicial experts and party-appointed experts, had reported their findings. One of the party-appointed experts was a “neuroscientist”, who was simultaneously a psychiatrist, neurologist, and electroencephalographer. He readily boasted of his “serene objectivity” to contest opposing opinions, and wrote the following testimony: “I note that Dr. L. is a neurologist and that I myself am officially a neurologist, psychiatrist, and electroencephalographer and currently a neuroscientist that is, fully immersed in the field of neurosciences, the very subject that is involved in the case at hand. With the most serene objectivity, I can add the following observations to Doctor L.’s certificate [...]. The electroencephalogram already revealed slow overloads on the left lobe and, as I myself had pointed out, the beginnings of a hydrocephalus had been noted, a state of posterior leukoaraiosis as opposed to what Doctor L. says, the neuropsychiatric angle was directly targeted, and since I point it out, I have been qualified in both fields since 1952! [...] The answer is therefore clear: there was an alteration of cognitive function noted by my colleague and myself, associated with a depressive state. In conclusion, with respect to the facts I report [...] I can say that it is highly probable to consider that [...] in May 2001, Y.D. presented the same alteration of cognitive function noted in November 2000”⁵⁷. Nevertheless, this demonstration of authority was not enough to convince the judges. They managed to maintain their independence of judgment, demanding proof that the person was not mentally competent precisely at the time the legal document had been signed, and ultimately ruled against the party contesting the will, finding there was insufficient evidence to nullify it on the grounds of mental incompetence. This leads us to analyze the motivation for judges to take brain scans into account, and to allow such imagery to sway their conviction about the individual’s mental abilities.

3. Evaluating the persuasiveness of brain images

There is no doubt that for neurodegenerative diseases, images of the deterioration of the brain contribute to the validation of a medical diagnosis. Nevertheless, even in this context, converging indications (including psycho-motor examinations, in particular) must be brought to bear on the decision. This is all the more reason to be certain that a brain scan or MRI alone is not sufficient evidence to

⁵⁷ Cour d’appel d’Aix-en-Provence, 27 mars 2012, n° 10/21679.



justify a legal determination of incompetence. However, we should go beyond this idea, and understand that the legal concept of the person – the individual entitled to rights and bound by obligations, whose deeds are woven into legal life as if it were the lining of social life – does not necessarily need the same sort of mental evaluation and evidence as a doctor seeking to diagnose a disease or track its development. This is one of the points of the *Van Middlesworth* decision cited earlier. The Michigan Court of Appeals formulated the position of American law in these terms: “the test of mental capacity to contract is whether the person in question possesses sufficient mind to understand in a reasonable manner the nature and effect of the act in which the person is engaged. To void a contract it must appear not only that the person was of unsound mind or insane when it was made, but that the un-soundness or insanity was of such a character that the person had no reasonable perception of the nature or terms of the contract.” Regarding testamentary capacity, the ruling in *American Trust & Banking Co. vs. Williams* notes: a testator “is not rendered incapable of making a will by [...] old age, blunt perception, or failing mind or memory, if his mind is sufficiently sound to enable him to know and understand what he is doing. [...] Evidence of a prior mental condition due to temporary, superficial, accidental, occasional or intermittent causes or conditions has little or no probative value-not enough to shift the burden of proving the testator's condition at the very time the will was executed”⁵⁸.

According to this reasoning, brain imagery alone can never be considered sufficient to prove that the testator was not of sound mind when the will or deed was written. The *In re Estate of Leath* case, ruled on in 2008 by the Tennessee Court of Appeals, involved proving that the testator had lost his mental capacity to revoke a will before his death. It illustrates the insufficiency of brain scans. Despite an electroencephalogram (EEG) showing “an abnormal finding” and an MRI scan showing “that the decedent had suffered a “mini stroke” as the result of the occlusion of a very small blood vessel in the brain”, despite “an episode of confusion” with hospitalization and symptoms like “memory difficulties, such as forgetting to answer the phone or to take a bath; emotional ups and downs; short temper; and falling asleep frequently through the day” and a test score indicating “mild dementia”, and despite Dr. B.’s testimony that “it was his opinion that the decedent would not have been able to understand the implications of destroying a will at the time of his last consultation”, the Court concluded that “appellants failed to meet their burden of showing that the decedent could not have known or understood what he was doing with respect to the revocation of his will after his last visit to Dr. B.”⁵⁹. The judges referred to the fact that the testator’s symptoms varied from one visit to the next, and could sometimes improve (or worsen). Hence proof of the testator’s mental incapacity at the time of the presumed revocation was not provided. The majority of French case law follows the same line of reasoning. There are several examples of the same commitment to verifying the evidence of mental incompetence or mental illness at the time the will was executed, thereby ruling out pure and simple deduction based on brain images⁶⁰. We can cite a 2013 decision by the Limoges

⁵⁸ *American Trust & Banking Co. v. Williams*, 32 Tenn. App. 592, 225 S.W.2d at 83 & 84.

⁵⁹ *In re Estate of Leath*, 294 S.W.3d 571 (Tenn. Ct. App. 2008).

⁶⁰ See, for ex. Cour d’appel de Paris (3, 1), 07 septembre 2011, n° 10/15661; Cour d’appel de Versailles, 26 janvier 2012, n° 10/01549; Cour d’appel d’Aix-en-Provence, 27 septembre 2012, n° 11/17210; Cour d’appel de Saint-Denis de la Réunion, 2 novembre 2012, n° 11/01055; Cour d’appel de Douai, 18 mars 2013, n° 12/00967; Cour d’appel de Limoges, 20 juin 2013, n° 12/00379; Cour d’appel de Versailles, 30 octobre 2014, n° 13/03977;



court of appeals, which ruled that the oath sworn by a witness to the signature of the will had to prevail over an MRI showing degeneration⁶¹. In a 2015 ruling, the Versailles court of appeals motivated its refusal to void a deed, judging that: “although the expert witness referred to a brain scan done in November 2000 as evidence of this disorder, because it demonstrated ‘bi-temporal atrophy and widespread leukoariosis resulting from arterial disease,’ we cannot draw any immediate conclusions about the mental and intellectual capacities of Mr. S from this examination, objectifying physiological damage. Only in 2006 was it observed that his competence was affected”⁶². When an MRI or brain scan was carried out after the will or deed was written, and one party tries to draw *retrospective* conclusions about the *probable* condition at the time, judges are even more circumspect. For example, in a 2011 ruling, the Douai court of appeals indicated that the “various pieces of medical evidence [that have been] examined [including a scan showing cerebral atrophy and significant ischemic lesions in the left occipital and frontal-parietal regions] do not demonstrate that on September 24, 2003, Ms. M. was subject to mental disorders that would have altered her ability to reason, and that the reason the guardianship proceedings were initiated, as observed by the specialist physician on January 29, 2004, already existed in 2003 when the will was written. [...] Neither the expert report by Doctor B., dated January 29, 2004, nor the letter he wrote, dated April 16, 2004 in which he noted that dementia “had probably been developing for several years”, mention that her state was irreversible, and that its serious nature existed four months earlier, when the will was written, and that as a consequence, at that time, Ms. M.’s mental faculties would already have been irreparably impaired”⁶³. In a 2015 decision, the Montpellier court of appeals wrote that: “since neither Doctor V. nor Doctors Y. or S., or Professor V. examined Mr. R. while he was living, and were therefore unable to make any clinical observation of him, they were limited to interpreting the results of the MRI. They noted in their reports the probability that higher brain functions and the ability to reason were affected, but they were nonetheless unable to specify whether this damage was severe enough to establish the fact that the testator was mentally incompetent on October 22, 2007 [i.e., two months earlier]”⁶⁴.

Hence, to determine a person’s mental condition, the majority of judges do not appear to suffer from an excessive confidence in brain scans which would lead them to draw hasty conclusions from the interpretation of a scan or MRI. On the contrary, they show a certain ability to reframe the results of the examination within a whole set of elements tending to prove mental competence or incompetence. This should reassure us that there is at the moment little risk a neurobiological, deterministic vision of the individual will prevail in the courts. By refusing to proceed by retrospective extrapolation to deduce the mental state of an individual on the basis of visible brain damage (or anatomical

Cour d’appel d’Agen, 8 juin 2016, n° 14/01017. In the same sense, regarding the protection of adults: Civ.1, 6 juillet 2011, n° 10-22.742; Cour d’appel de Grenoble, 13 février 2015, n° 14/04789.

⁶¹ Cour d’appel de Limoges, 20 juin 2013, n° 12/00379: The oath legally sworn by a witness who stated he was present at the time the will was signed and was able to observe that the testator was in full possession of his mental faculties prevails over an MRI showing deterioration and interpreted by a neurologist in the following terms: «it seems very unlikely to me that the patient would have been technically capable of writing a document on January 28, 2008, and even that he was in full possession of his intellectual capacities”.

⁶² Cour d’appel de Versailles, 26 novembre 2015, n° 13/06211.

⁶³ Cour d’appel de Douai, 19 mai 2011, n° 10/02645.

⁶⁴ Cour d’appel de Montpellier, 5 mars 2015, n° 12/03466.



differences), judges are resisting the purely deterministic reasoning which has been so widely criticized⁶⁵. Instead, civil case law, in both France and the US, seems to rely on a complex vision of human will. In addition to the biological substrate – the brain, its anatomy, and its function – social interactions and outer signs of self-determination are taken into consideration. The person's relationships with other people and the perception of those around the person of his or her mental faculties seem to play an important role in the judges' evaluations. The drive to write a will, enter into a contract, or to make a gift becomes, in a way, an expression of "personal identity"⁶⁶ which integrates a social dimension.

Within the context of their sovereign power to evaluate the facts, judges seem to make reasonable use of brain images as evidence. On the whole, this observation is consistent with information available about civil case law in Britain or the Netherlands⁶⁷. In fact, this reasonable use may extend beyond civil court matters: French administrative case law contains convergent opinions⁶⁸, and Deborah Denno's analysis of the use of brain imagery in US criminal cases comes to similar conclusions⁶⁹. These findings reassure us that judges continue to demonstrate independence, and also permit us to draw two further conclusions. First, we concur with those who challenge the idea that these images may "fascinate" the judge.⁷⁰ Secondly, the legal interpretations of such terms as "will" and "mental competence" seem to be independent from those suggested by the cognitive sciences and neuroscience⁷¹. Regarding the difference in interpretation of concepts mentioned above, the point is not to say that the judicial sphere is impervious to advances in the neurosciences. Instead, the justice system receives this knowledge within a specific context and, following its own purposes and rationality, makes appropriate use of the knowledge. Regarding "the fascination effect", we note that professional judges, armed by experience, are less subject to it than jurors, who are not professionals. However, even judges may feel ill-equipped to understand the findings of an especially technical expertise, or to evaluate the relevance of statistical evidence. Several studies have pointed out the French judge's *de facto* (as opposed to *de jure*) dependency upon the findings of expert statements⁷².

⁶⁵ R.J. RYCHLAK, J.F. RYCHLAK, *Mental Health Experts on Trial: Free Will and Determinism in the Courtroom*, in *West Virginia Law Review*, vol. 100, n° 193, 1997: <https://ssrn.com/abstract=2276258> (last visited 01/11/2017).

⁶⁶ J.A. CHANDLER, *Mind, Brain and Law: Issues at the intersection of neuroscience, personal identity and the legal system*, in J. CLAUSEN, N. LEVY (ed.), *Handbook of Neuroethics*, Dordrecht: 2015, p. 441.

⁶⁷ L. CLAYDON, P. CATLEY, *Neuroscientific Evidence in the English Courts*, cit.; C.H. DE KOGEL, W.M. SCHRAMA, M. SMIT, *Civil Law and Neuroscience*, cit.

⁶⁸ CE, 25 juin 2014, n° 375081: ruling aimed at determining the cognitive condition of a person on life support, to obtain a court order justifying the removal of life support. Justices from the Conseil d'Etat (the supreme court of administrative justice) advised that medical evidence and brain scans be balanced by non-medical observations and «the circumstances unique to each patient».

⁶⁹ D.W. DENNO, *The Myth of the Double-Edged Sword: An Empirical Study of Neuroscience Evidence in Criminal Cases*, in *Boston College Law Review*, 2015, vol. 56, p. 493.

⁷⁰ M.J. FARAH, C.J. HOOK, *The seductive allure of "seductive allure"*, cit., p. 90.

⁷¹ S.J. MORSE, *The Status of Neurolaw: A Plea for Current Modesty and Future Cautious Optimism*, in *Court Review* 2014, vol. 50, p. 94.

⁷² A. LORIEUX, *L'expertise et le jugement*, in M.-A. FRISON-ROCHE, D. MAZEAUD (dir.), *L'expertise*, Paris, 1995, p. 124; L. DUMOULIN, *L'expertise judiciaire dans la construction du jugement: de la ressource à la contrainte*, in *Droit et société* 2000, n° 44-45, p. 212; R. ENCINAS DE MUNAGORRI, v° *Expert et expertise*, in D. ALLAND, S. RIALS (dir.), *Dictionnaire de la culture juridique*, Paris, 2003; O. LECLERC, *Le juge et l'expert. Contribution à l'étude des rapports*



Therefore, we cannot completely rule out the possibility that the judge may lose his critical independence, faced with a certain interpretation of brain imaging (especially a functional MRI). This is all the more likely to occur when the evidence is not subject to sufficient discussion and counter-arguments. It would be excessively naïve to leap to the conclusion that our judicial systems are immune to negative evolution in the future. Indeed, we shall not neglect the risk that the use of new imagery techniques (especially functional ones) may provoke a disruption. Besides, certain rulings are already decisively motivated by brain scans. The slope is still slippery.

In fact, this survey of legal practices would be incomplete if we did not discuss cases in which brain scans appear to have played a decisive role⁷³. This is notably the case when conflicting views are expressed among medical experts. To settle a controversial discussion between experts, some judges seem to favor evaluations based on the results of imagery. For example, in a case where a will was contested and in which no fewer than six physicians provided their opinions (in reports, letters or testimony), the Limoges court of appeals gave more weight to conclusions based on brain images. The motivation favored the opinion of hospital practitioners based on “precise, detailed medical documents” and on the observation of “a cortical atrophy visible on the brain scan and a disturbance of the mini-mental test”, dismissing statements from other specialists, one of whom was a hospital neurologist who certified that he “had examined Mr. M” and had “not observed any physical or cognitive anomalies that would have made him incapable of managing his own business”⁷⁴. The reference to brain scans clearly served to validate the evaluation with information from a source that was presumed to be “objective”, as opposed to appearances and the results of other medical examinations. A ruling by the Douai appeals court even allowed medical findings based on the results of a brain scan to prevail over the testimony of health-care professionals, friends and acquaintances, and stating that the testator was in “a satisfactory state of consciousness”⁷⁵. The will dividing the testator’s assets between her children, contested by some of the beneficiaries, was therefore nullified, even though testimony concurred regarding the principal’s ability to express herself coherently and her rich social life, and in the absence of any medical consensus about the principal’s mental faculties. In this case, the persuasiveness of the brain scans seems to have been decisive. It should be noted, however, that this prejudice in favor of a type of evidence, thought to be *objective* as opposed to *subjective* testimony, does not necessarily lead to nullification. It may also sway the balance in favor of the validation of a legal act (or recognition of the person’s ability to make a valid commitment)⁷⁶. However, regardless of the outcome of the proceedings, it is clear that in such cases, judges grant greater weight to brain scans than to other evidence. Along the same lines, certain motivations show that the judge accepted retrospective interpretations of brain scans without any serious discus-

entre le droit et la science, Paris, 2005, n° 200, p. 163; G. CANSELIER, *Les données acquises de la science. Les connaissances scientifiques et la faute médicale en droit privé*, Paris, 2006, n° 294, p. 467.

⁷³ Cour d’appel d’Aix-en-Provence (1ere B), 4 novembre 2010, n° 09/18692; Cour d’appel de Nîmes, 12 avril 2011, n° 09/02805; Cour d’appel d’Aix-en-Provence, 24 novembre 2011, n° 09/21509; Cour d’appel de Bourges, 30 avril 2014, n° 13/00343; Cour d’appel de Dijon, 12 juin 2014, n° 11/02851; Cour d’appel de Metz, 10 novembre 2016, n° 14/02969.

⁷⁴ Cour d’appel de Limoges, 22 septembre 2011, Confirmé par Civ.1, 15 mai 2013, n° 12-14.733

⁷⁵ Cour d’appel de Douai, 14 février 2011, n° 10/02247.

⁷⁶ See, for example: Cour d’appel d’Aix-en-Provence, 19 mai 2011, n° 10/14484.



sion. Shown a scan or MRI indicating advanced Alzheimer's disease or dementia, some judges seem to automatically conclude that the author of a will or other legal instrument could not have been of sound mind at the time it was signed or executed. For example, a will established on September 1, 2003, was rescinded for the testator's mental incompetence because a brain scan carried out on March 26, 2004 showed "widespread cortical and sub-cortical cerebellar atrophy, slightly more distinct than on the earlier scan". Moreover, a psychiatrist expert witness who saw the testator in February 2006 noted "significant evolution of her Alzheimer's disease", and estimated that "the onset of the Alzheimer's was about three years ago"⁷⁷. The judges did not seek any other evidence that would have provided a more specific description of the principal's behavior and health in September 2003. Here, the lack of precision (*about 3 years ago*) does not seem to have bothered them. Taking the degenerative process for granted, they ruled in favor of a claim based on hindsight. They looked at the findings of a brain scan carried out six months after the will was written and a diagnosis from the present time, and presumed that the disease had been evolving continuously and gradually, basing their evaluation of the testator's competence on that deduction. The court simply ignored facts that are clearly indicated by medical literature and corroborated by daily experience: that the course of Alzheimer's disease differs from one individual to another, and therefore the alteration of cognitive faculties must be evaluated on a case-by-case basis. Just as a brain anomaly does not invariably transform every person who presents it into a criminal, an anomalous brain scan suggesting a neurodegenerative disease does not mean that every individual will be legally incompetent⁷⁸. Nevertheless, our study shows that such reasoning by hindsight on the basis of a brain scan is not the general rule. Should it become a common way of thinking – if evidence of an anatomical anomaly of the brain sufficed to prove mental incompetence, great difficulties would undeniably arise. It would be necessary to modify currently accepted definitions of will and mental capacity, associated with both self-determination⁷⁹ and the social aspects of legal judgment (which takes expectations, behavior, appearances, and interests into consideration)⁸⁰. We sincerely hope that such developments will be avoided.

4. Conclusion

In conclusion, our analysis of existing civil case law shows that, overall, judges in both France and the United States make use of their freedom of evaluation – in addition to the *Daubert standard*, in the US, enabling judges to evaluate the admissibility of evidence – in such a way as to strike a reasonable balance between brain images and other types of evidence when establishing a person's mental condition. This fact pleads against the idea that a purely biological, deterministic vision of will and

⁷⁷ Cour d'appel de Lyon, 29 mars 2016, n° 14/05309.

⁷⁸ M.B. KAPP, *Legal Issues Arising in the Process of Determining Decisional Capacity in Older Persons*, in *Care Management Journals: Journal of Long-Term Health Care*, 2010: <https://ssrn.com/abstract=1568888> (last visited 01/11/2017).

⁷⁹ J. CRAIGIE, A. CORAM, *Irrationality, Mental Capacities and Neuroscience*, in N.A. VINCENT (ed.), *Neuroscience and legal responsibility*, op. cit., p. 85.

⁸⁰ J.A. DROBAC, *The Myth of 'Legal' Consent in a Consumer Culture*, in A. PAWAR (ed.), *Facets of Consumerism in a Global Economy*, New-York, 2015: <https://ssrn.com/abstract=2647488> (last visited 01/11/2017).

mental competence or capacity would prevail in the courts as neurological imagery is submitted to legal files with increasing frequency. It is true that MRIs and brain scans have become significant pieces of evidence, and that a growing number of rulings refer to them. Our study also confirmed that certain judges are more inclined than others to seek “objective” proof from brain scans, in an effort to reassure those who fear that the determination of someone’s mental competence is too subjective. Nevertheless, the great majority of the judicial decisions analyzed in our study consider brain scans as part of a wide spectrum of evidence including social, behavioral, and relational observations as well as medical and neurological considerations. Moreover, the adversarial procedural principle, requiring hearing from every party in the litigation, increases the possibility that light will be shed on the limitations of the findings and the existence of alternative interpretations. Chances that courts will provide independent settlements grow subsequently. It would be naive to deny the risk that, in the future, the situation may take a turn for the worse. However, it is important to observe that today, in France and, as far as we know, in the United States, civil judges are not fascinated by neuroscience and brain images, and that civil law provides the resources necessary to make good judicial use of brain scans.