The public radio show about law and American life

Justice Talking
Radio Transcript

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Some lawyers are using brain scans showing defects to argue that their clients aren't responsible for criminal behavior. In recent years, this neuroscientific evidence has been increasingly used in our courtrooms. But some scientists argue that the imaging is still new and unreliable, while others question whether juries should be ruling on what counts as a "defective" brain. As neurolaw grows in influence, it could potentially revolutionize our notions of guilt and punishment as criminals say "my brain made me do it." Might we be, one day, just a brain scan away from a form of lie detection and prediction of criminal behavior? Tune in as we examine this new frontier of law on this edition of Justice Talking.

MARGOT ADLER: From NPR, this is Justice Talking. I'm Margot Adler. On today's show, neuroscience and the law: Research is moving at a fast pace to define the boundary between the brain and the mind.

UNIDENTIFIED MALE: Sort of like an "aha" response that we can measure in the brainwaves and detect with a computer and we can say, all right, that person knows that information.

MARGOT ADLER: And the power of this emerging science in the courtroom is already changing the American legal system, one brain scan at a time.

UNIDENTIFIED MALE: So, I mean, there's all kinds of, uh, sort of interpretive questions that are presented in this area. But the arguments about those limitations are largely academic though, because as, at least as far as the criminal context is concerned — and the civil as well — this is coming into the courtroom.

MARGOT ADLER: Neuroscience and the law, coming up after the news.

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MARGOT ADLER: This is Justice Talking from the University of Pennsylvania's Annenberg Public Policy Center. I'm Margot Adler. Uncovering the workings of the brain is one of the great frontiers in science today. Researchers are mapping how behavior, mental illness, trauma, disease, memory — just for starters — can be tracked in the brain. Hundreds of studies, exploring a wide range of questions, are published every year. Scientists are quick to say neuroscience is in its infancy, but the legal system is moving just as quickly to make use of this new technology in the courtroom. Today on Justice Talking, neuroscience and the law. Attorneys have introduced brain scans in hundreds of cases over the last decade, both criminal and civil. The science is deepening our understanding of everything from deception to impulsiveness to depression. Legal scholars and ethicists say the use of this technology will test many of our constitutional protections — from the right not to incriminate oneself, to protections against unreasonable search and seizure, not to mention privacy concerns.

But Mary Kennedy, a lawyer in Iowa, says furthering our understanding of the brain holds great promise, too. Kennedy made headlines in 2000 when she was the first to convince a court to admit a controversial new technology as evidence that her client, Terry Harrington, had been wrongfully convicted of murder. That evidence eventually led to Harrington's release after serving 25 years behind bars. Kennedy says she had always believed Harrington's story, that he was innocent. But she wasn't making any headway. Then she heard about a Harvard-trained neurologist named Larry Farwell with a local company that did something called "brain fingerprinting" and she thought:

MARY KENNEDY: I'm willing to go and look at anything, try anything because you just never know. I mean when you've got somebody in life without parole we've got nothing to lose to give it a try. I never believed he was guilty, so if Dr. Farwell's science didn't help us, we wouldn't be any worse off, and Terry wouldn't be any worse off.

MARGOT ADLER: Dr. Farwell's science consists of brain images that highlight the parts of the brain that become activated in response to pictures or information of, let's say, a crime scene.

LARRY FARWELL: We take this headband. [SOUND OF VELCRO RIPPING OPEN] It attaches with Velcro around the head. And there are sensors embedded in the headband that pick up the electrical activity from the brain, noninvasively, from the outside of the scalp. You connect this

MARGOT ADLER: Farwell has since moved his operation from Iowa to this Seattle office. He's holding a blue, fabric-covered headband which senses brainwaves. Cords coming out of the back of the headband feed the data to a nearby computer and register if subjects recognize what they're seeing.

LARRY FARWELL: Sort of like an "aha" response that we can measure in the brainwaves and detect with a computer and we can say, all right, that person knows that information. So if it's the details about a crime that would be known only to the perpetrator and investigators, and not to the public, then that provides evidence the person was there. Or if it's details of a crime that

would clearly be known to the perpetrators — salient facts about the crime — and he doesn't know them, then that provides evidence that he wasn't there.

MARGOT ADLER: Mary Kennedy was hoping that this brain scan would show that Harrington had no memory of the parking lot in Council Bluffs, Iowa, where a security guard named John Schweer was shot to death in 1977. Authorities believed Schweer was shot interrupting a theft. Harrington, whom Kennedy says did not want to be interviewed for this story, had seen the evidence put forward against him again and again over the years. Farwell says that presented a challenge.

LARRY FARWELL: We then had to go back through the records and discover information that he hadn't been told, things that he wouldn't know unless he were there.

MARGOT ADLER: What's more, Farwell says the test showed Harrington did remember details of the concert he said he was attending in Omaha when the crime was committed. After being confronted with the scan, Harrington's lawyer says a key witness recanted. Suppressed evidence was also discovered, which named a different suspect.

MARY KENNEDY: The whole thing was just amazing. It was just — I don't know if you want to call it luck or divine intervention — but the things did just fall into place. And I'm not saying it was easy, but after years and years of basically we were just treading water, doing the best we could, and uncovering things, but nothing that was going to turn the case around — until this happened.

MARGOT ADLER: Kennedy says gaining the court's permission to admit the evidence was also a feat. Other lawyers, she says, were incredulous and told her she was grasping at straws.

MARY KENNEDY: It was unknown to people. And just the explanation of it sounded to people to be so far out, science fiction-type things to be used in a courtroom, and a lot of people actually laughed and, you know, thought it was just something so far out that it would be ridiculous. But I knew it wasn't. I mean, we believed in it.

MARGOT ADLER: The prosecution did not believe in it. County attorney Matthew Wilber did not return calls for this story but he has called brain fingerprinting "hogwash." And he is quoted in newspapers saying he is still convinced that the jury made the right decision in 1978, and the right man went to prison for 25 years. Wilber also reminded the public that the recanting witness was an alleged accomplice in the robbery and a friend of Terry Harrington. But neurologist Larry Farwell says brain fingerprinting helped to do what Harrington's earlier appeals could not do.

LARRY FARWELL: In the Harrington case, Terry Harrington had lost in court five times. Three times in the state of Iowa and twice in the federal court. The critical thing is that we proved to the court's satisfaction that the science was accurate and that it was well accepted in the scientific community. Let's apply that science and save lives. If we had applied brain fingerprinting 23 years earlier — of course, it wasn't available — but if we'd applied brain fingerprinting 23 years earlier, Harrington wouldn't have gone to prison.

MARGOT ADLER: Terry Harrington was released in April of 2003. He is now pursuing a case against the state of Iowa for wrongful conviction. Cases like Harrington's are still rare, but one legal expert on neuroscience says other uses of the technology are already common.

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MARGOT ADLER: Carter Snead is a law professor at the University of Notre Dame, and an expert on the intersection of law and bioethics. He was general counsel to President Bush's Council on Bioethics. Welcome to Justice Talking.

CARTER SNEAD: Thank you very much.

MARGOT ADLER: Brain scans show images of reduced or increased blood flow in different parts of the brain, areas associated with impulse control or judgment or memory. Carter, you say there's still a lot to know about brain science and what it really means, but the courts are not waiting.

CARTER SNEAD: There are folks who have criticized drawing conclusions from these images, but nevertheless, courts will admit them and allow the jury to decide for itself after hearing all the evidence. Whether or not showing that, for example, this person's prefrontal cortex — which is the part of the brain sort of at the front and above and behind the eyes which has been associated by many researchers with impulse control; sort of long term planning, and things like that, sort of higher level reasoning — that inhibitions in that particular part of the brain might be associated with certain kinds of impulsive violence or other kinds of violence. Or a certain inability to mediate or to control one's, one's sort of criminally-violent impulses. So, I mean, there's a lot to wonder about in terms of what exactly these are being, are demonstrating. But, nevertheless, they are being used.

MARGOT ADLER: Now, you said that there were a lot of divisions between legal scholars and scientists about, you know, what was appropriate, what this was showing. What are the main divisions among scholars and researchers?

CARTER SNEAD: Yeah, I would say that you have on the one hand, I mean, in the research community, on the one hand you have folks who are very sort of very conservative in using these kinds of techniques and saying well, we shouldn't, these are not quite ready for prime time. They are showing very interesting things, but we need to really nail down precisely what it is that we're showing. There are all these sort of, technical and interpretative questions that remain. That's sort of one side, but on the other side you have very enthusiastic researchers and defense attorneys and some legal scholars who believe that it is in fact ripe for actual real world applications. And this really came out in the context of a very famous Supreme Court case a couple of years ago, *Roper v. Simmons*, which ultimately overturned the juvenile death penalty. And part of the evidence marshaled in that case were two briefs submitted by the American Medical Association and the American Psychological Association, which among other things, cited neuroimaging studies showing that because of, sort of structural and functional immaturity of their brains, that teenagers are categorically incapable of the sort of impulse control, long-term

planning, and so forth, that would be necessary to hold them responsible in the same way that you would hold an adult responsible.

MARGOT ADLER: When I read in all the articles that I was reading, before doing this program, it did occur to me that saying that an adolescent's brain is not fully developed is one thing that I think probably most people would just on the surface say: probably true. It's very different than saying, uh, well we can look at a brain through imaging and decide that someone is culpable or not culpable. That seems, that seems a bigger stretch.

CARTER SNEAD: It does seem like a bigger, a bigger leap. Now, the one interesting thing is, I mean, is I mean we've got sort of famous examples throughout history. The earliest of which are the — maybe the most interesting historical example is Phineas Gage — who was the railway worker who had a railroad spike driven through his prefrontal cortex and it ultimately, it totally changed his personality. He went from being a very responsible, respected member of the community to an essentially incorrigible ne'er-do-well who had no respect for others and engaged in all sorts of antisocial activity. And so people from that kind of example, people say well maybe, maybe there is something to the fact that, you know, insults to the brain result in radical personality changes that have implications for criminal behavior.

MARGOT ADLER: So looking at, the use of brain imaging and all these neuroscience technologies, first of all, how common is this? You know, is it still only being used rarely? And what do you see as the limitations?

CARTER SNEAD: Neuroimaging is — literally the field is exploding. I mean, it's ... they're taking on all sorts of interesting questions, both with lower brain functions as well as higher cognitive functions. And in the law I think there's an, there really is ... you can see a sort of a trend upward towards introducing this kind of stuff. And as I say, I think, in the civil context, they've been introducing it about — personal injury lawyers have to either show the fact of brain injury or even to a slightly lesser extent causation. But in the criminal context, they've introduced it at the guilt phase of the trial where they try to show the person is either legally insane. So, I mean, there's all kinds of, uh, sort of interpretative questions that are presented in this area. But as I said before, most of those arguments about those limitations are largely academic though because as, at least as far as the criminal context is concerned, and the civil as well, this is coming into the courtroom.

MARGOT ADLER: Carter Snead is a law professor at the University of Notre Dame. Thank you so much for coming on our show.

CARTER SNEAD: Thanks a lot.

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MARGOT ADLER: Later in the program we'll take a closer look at the science of lie detection; and a conversation — could neuroscience lead to a more mechanized justice system? Coming up, experts in law and neuroscience tackle the subject of what brain research could mean for jurisprudence in America.

UNIDENTIFIED MALE: Eventually is that, our major notions of free will are going to go out the window.

MARGOT ADLER: But others say the American justice system works just fine the way it is, even with deepening knowledge of the brain and its functions.

UNIDENTIFIED MALE: But ultimately, you're always going to have an acting human agent, and that acting human agent is what needs to be evaluated in terms of, let's say, rationality for responsibility.

MARGOT ADLER: Today on Justice Talking, neuroscience and the law. Stay with us.

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MARGOT ADLER: This is Justice Talking, the public radio show about law and American life. I'm Margot Adler. Today we're exploring how brain research is changing our justice system. In civil cases, brain images are used in court to show trauma and bolster claims for damages. In criminal cases, defense attorneys have used images of brain disorders to question if clients facing capital punishment deserve to die. Legal scholars say it won't be long before prosecutors get into the game and use brain images to show evidence of criminal tendencies. Here to explore the implications of neuroscience on the law is Stephen Morse, a professor of law and psychiatry at the University of Pennsylvania and Joshua Greene; an assistant professor in the department of psychology at Harvard University. Welcome both of you to Justice Talking.

STEPHEN MORSE: Hello.

JOSHUA GREENE: Thanks. Pleasure to be here.

MARGOT ADLER: Brain scans are showing up in the courts for all kinds of cases, sometimes to raise questions about diminished capacity to form intent to commit a crime. Does brain imaging really show this?

STEPHEN MORSE: It couldn't possibly show this. There are two points to make clear right at the beginning: The criteria in law for responsibility and competence are all behavioral, broadly speaking, to include mental states and actions, and unless there was an absolute precise correlation between the behaviors the law was concerned with and particular brain findings, brain findings can't show diminished capacity. All they can show is a state of the brain. A state of diminished capacity is a state of diminished rationality. That's a behavioral state.

MARGOT ADLER: Josh, do you agree with that?

JOSHUA GREENE: I suppose that I come to this from psychology and philosophy as well as neuroscience. And I have some doubts about whether or not the letter of the law really conforms to people's intuition about who's responsible and who's not. So the law says that you're responsible for this bad thing, that you did — if you were rational at the time, that you

committed the act. And that's a consistent standard that one can attempt to apply. But I think that it's not necessarily what people really deeply intuitively have in mind. Was it this person? This mind? This soul that committed this crime? Or was it just some mechanical thing, like a brain tumor or something they couldn't control, like their genes or something like that? And the reason why we're prompted to ask this question — can brain imaging change the way we think about the law — is because what neuroscience does is it gives us a mechanical picture of a human agent. And I think that that mechanical picture — even though I think it correct, is not compatible with our ordinary intuitions about, responsibility. And so I think that's where this tension comes from, and that's why the questions about neuroscience and its implications arise.

STEPHEN MORSE: Uh, can I respond to what Josh just said?

MARGOT ADLER: Absolutely.

STEPHEN MORSE: I think Josh is absolutely right about a lot of people's intuitions, about dualism, and about the notion that there's got to be a soul or a mind independent of the body. And if it's just a machine that did it, well, gee, how can people be responsible? So let's even take a case of a brain tumor. A brain tumor doesn't cause someone to have a reflex motion of their arm, let's say, when they shoot somebody. It might in effect work through giving them crazy reasons for doing what they're doing or something of the sort. But ultimately, you're always going to have an acting human agent, and that acting human agent is what needs to be evaluated in terms of, let's say, rationality for responsibility.

MARGOT ADLER: So, so, if we really don't know so much about how the brain works, should judges and juries really be in the role of defining what a normal or properly working brain is? I'll ask both of you that. Let's start with you Stephen.

STEPHEN MORSE: Well, the question is not — what is a properly working brain. The final pathway in law is always behavioral. Did this person act competently? Did this person act rationally? That's what needs to be decided. Let's assume that the person acts really rationally. There's no question about it. At that point I don't care what their brain looks like, they're responsible. If the person is clearly irrational by anybody's standards, I don't care what their brain looks like, they are not responsible. But now, let's say, we have somebody in between, you know, where it's, you know, when you look at the behavioral evidence it's not really so clear. But there is a question. There if we had good neuroscience data showing relations between particular states of the brain and particular behaviors that the law cared about, then that sort of evidence might in fact be useful to us. And are judges and juries neuroscientists? No. But neither are they orthopedic surgeons or art experts. We bring in experts all the time to explain to expert evidence to judges and juries. And I see no reason why competent neuroscientists like Josh couldn't do the same here.

MARGOT ADLER: Josh?

JOSHUA GREENE: What's interesting with what Stephen said is that he believes that there is a mechanical cause behind every human action. That ultimately it's all neurons causing your muscles to contract and that's what human behavior is. Well, if you've already come to that

conclusion, then is it necessary to understand the details? If what's really in question philosophically is whether or not there's a distinction between a guilty mind and a broken brain. And we know that a guilty mind or a mind of any kind is ultimately just a brain of some kind, whether you want to call it broken or not — then in a sense we've already answered the question.

MARGOT ADLER: Even if we don't understand all of that, the fear, I think, that many people have is that as this goes forward all of our notions of free will are going to be sort of thrown out the window. Is that where we're going? Josh?

JOSHUA GREENE: I think that what's exactly going to happen, eventually, and this may take 500 years or 1,000 years, but eventually is that our major notions of free will are going to go out the window. That is, free will as we ordinarily conceive it as, the behavior of an unmoved mover, as a mind that is separate from the causal flow of the universe. And that really has the true possibility of making both A happen and B happen by deciding, and in a way that's free from determination by prior cause — that I think will go out the window and I think that's the big change that we're talking about. There is a sense of free will that I think we will always retain, which is the one that right now is the one that's most relevant to the law, at least as it's written; and that is that people have beliefs, desires, values, and their beliefs, desires, and values are what cause their behaviors. And that we certainly do have and that's important, and that's relevant but it's not everything that we want out of free will. It's not the kind of free will that, in my opinion, underwrites that retributive impulse.

MARGOT ADLER: Stephen?

STEPHEN MORSE: Well, I don't think that kind of free will does underwrite the retributive impulse. In fact, most of the people who think of themselves as at least as heavily retributive in their theoretical orientation towards punishment are people who believe we don't have this kind of prime mover/unmoved kind of free will that Josh referred to. We only have the ability to act for reasons and those reasons may be rational or may not be. So I, for instance, don't think we have free will in the strongest sense. And I think it's perfectly possible to have exactly the kind of legal system we have today even without that kind of free will.

MARGOT ADLER: Stephen Morse is a professor of law and psychiatry at the University of Pennsylvania. Also with me, Josh Greene is an assistant professor in the department of psychology at Harvard University. This is Justice Talking.

MARGOT ADLER: I'm Margot Adler. And we're talking about neuroscience and the law. The future of this technology clearly can take us into a kind of science fiction territory. You know, for example, predicting future criminal behavior. Suppose we could determine that a certain spot on a person's brain makes them more likely, let's say, to be a pedophile. Wouldn't there be huge implications for the criminal justice system and for democracy as well? I'll start with you Stephen.

STEPHEN MORSE: That's a political question, Margot. It requires a speculation about how much sort of our fears for safety will allow us to intrude upon what were formerly safeguarded liberties, and I don't know what the answer will be.

MARGOT ADLER: Do you find that this future should be approached somewhat fearfully? I mean I find myself, uh, a little scared by this.

STEPHEN MORSE: We're talking about our security versus our liberty — there is going to be an inevitable tension, and the question is how much we should balance that. Now, neuroscience and other sciences can give us lots more data, and at least we'll then know how many mistakes we're going to make in both directions; how many people we're going to think are violent who won't be, and how many people we're going to say are not going to be violent who will be. So we'll have these data. But then we're just going to have to have a discussion as a civil society together — how much do we want to balance security and how much do we want to balance liberty?

MARGOT ADLER: Josh?

JOSHUA GREENE: I think once again I agree with what Stephen said that it's really fundamentally a question about how we as a society want to trade off, uh, liberty for security, and there's no sort of formula for resolving that tension.

MARGOT ADLER: So, Stephen, if it happens that in the way future neuroscience shows that we are simply automatons driven not by reason but simply by our neurons, does that change everything?

STEPHEN MORSE: Well, if what you mean by that is mental states really are doing no work, and there are some people who make this argument now, if that turns out to be true, then I think really all bets are off. But of course, suppose, you know, a good neuroscientist was on the show here. Let's say Josh could convince us of this at the present. What should we do next? Should we vote Republican or should we vote Democratic?

MARGOT ADLER: So, Josh, as the philosopher, if we are, if it suddenly comes to be that all of your neuroscience proves that we are simply, you know, I don't know, automatons driven by our neurons, does it change everything?

JOSHUA GREENE: I think that would change everything. Although it's not quite clear how we would respond to it as Stephen's question about, okay, how do we vote illustrates. But I don't think that we're really in any danger ever of that being shown.

MARGOT ADLER: Why?

JOSHUA GREENE: I don't think that there's any serious question that our mental states do matter. The question is, what are our mental states ultimately? Are our mental states ultimately physical states of the brain, and does understanding that change the way we think about human nature and human action?

MARGOT ADLER: Joshua Greene is an assistant professor in the department of psychology at Harvard University. Stephen Morse is a professor of law and psychiatry at the University of Pennsylvania. Thank you both for coming on Justice Talking.

JOSHUA GREENE: Oh, thanks for having me.

STEPHEN MORSE: Thank you, Margot.

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MARGOT ADLER: If the American justice system depends on determining who did wrong and knew better, advances in lie detection are sure to throw the spotlight on how much we can trust the science behind the new research on deception. But Reid Frazier reports some of the boosters of state-of-the-art lie detection are already predicting the death of the polygraph.

UNIDENTIFIED FEMALE: [BUZZING NOISE IN BACKGROUND] Okay, we're just going to take some plain pictures right now. So you have a little chance to just rest and relax, and then we'll start up with a spatial task next, okay?

REID FRAZIER: That's Joelle Scanlan. She's talking to a man who's lying on a table with his head inside a machine that looks like a big beige donut. At this University of Pittsburgh imaging lab, Scanlan and her fellow researchers are studying computer images of the man's brain as he completes a series of memory games. The images come courtesy of a functional magnetic resonance imaging machine — that big beige donut. It uses a high-powered magnet to measure blood flow inside the brain. Joe Ricker, the neuropsychologist in charge of the study, says he'll use the images to find out how head injuries affect the prefrontal cortex, the part of the brain just behind the forehead. Knowing this, he says, will help find a key to diagnosis and treatment of brain injury.

JOE RICKER: This area of the brain is important because it mediates higher order or higher level information processing, such as problem solving, sequencing, determining alternate solutions to problems; and it's also important in brain injury research because it's the part of the brain most likely to be injured in a motor vehicle accident or a fall.

REID FRAZIER: The prefrontal cortex helps us plan shopping trips and navigate through unfamiliar parts of town. Some scientists think it may also help us perform another high level cognitive function: lying. Daniel Langleben is a psychiatrist at the University of Pennsylvania. A few years ago, he put 20 students in a functional MRI machine and told them to lie about which card they held in their hand. He was amazed at the results.

DANIEL LANGLEBEN: I was kind of, you know — my first impulse was to double-check whether it's real, by repeating, you know, reanalyzing the data a few times. And then, you know, it was — I have to say, it was hard to believe.

REID FRAZIER: Langleben says the data showed when the students were lying. He found three parts of the brain that lit up when students lied about the card in their hand. He theorized that

these parts of the brain were working harder to prevent the students from blurting out the truth. Langleben figures functional MRI may end up being a better lie detector than the polygraph, which measures four data points; temperature, pulse, blood pressure, and skin conductivity. By contrast, functional MRI records from about 20,000 data points inside the brain.

DANIEL LANGLEBEN: We collect information from, uh, tens of thousands of transmitters in the brain. And we know exactly where each one of them is, versus we're collecting data from four transmitters in the case of polygraph. Well, four versus tens of thousands, you usually will have better definition of the behavior that you're trying to outline.

REID FRAZIER: Back in Pittsburgh, Joe Ricker is one of many scientists uneasy about using functional MRI as a lie detector. He points out the technology has been tested mainly on college undergrads, and has yet to be tested on criminals, sociopaths, or pathological liars — people far more likely to find themselves in a defendant's chair. He also says the studies have offered no real jeopardy to subjects if they're caught in a lie.

JOE RICKER: You're basically, you know, telling someone to lie or telling someone to suppress a particular response, and that's a very different situation than, uh, someone who is lying to avoid a jail sentence or lying for financial gain, or lying because they're a habitual liar.

REID FRAZIER: But these concerns haven't stopped the private sector from taking an interest.

UNIDENTIFIED MALE: We really see this as a tremendous game changer in the judicial market.

REID FRAZIER: That's Steve Laken. He's a biotech entrepreneur and CEO of Cephos, a start-up he founded to market functional MRI for lie detection. He thinks the technology is perfect for use in civil litigation, like harassment or discrimination lawsuits.

STEVE LAKEN: We really believe that this technology can help bring light to those matters, when there's virtually no physical evidence, there's no forensic evidence — and it's one person saying that somebody said something to them inappropriately or touched them inappropriately in a workplace environment. And we believe that this technology can help bring resolution to those matters.

REID FRAZIER: But will Laken's potential clients be able to use this technology as evidence in a courtroom? To date, functional MRI lie detection scans have never been allowed as evidence in any kind of trial. The Supreme Court has ruled that for scientific evidence to be considered admissible, it must be widely considered valid. That's why the polygraph is generally excluded. But even if functional MRI passes this hurdle, there is another important question: Will courts let a machine decipher truth from falsehood? In a 1998 polygraph case known as Scheffer, four Supreme Court justices wrote that polygraphs may violate the 6th Amendment which outlines the right to a trial by a jury of one's peers. Here's Hank Greely, a Stanford law professor.

HANK GREELY: And in that case, four justices of the Court said that even if polygraphs proved to be reliable they shouldn't be allowed constitutionally because it would invade the province of the jury too much, that the jury in our system should be the ultimate lie detector.

REID FRAZIER: Greely says if brain imaging can be counted on to tell truth from lies, we'll have to decide who can use it, for what purposes, and on whom. And on these questions, he says, we don't have any answers yet. For Justice Talking, I'm Reid Frazier.

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MARGOT ADLER: Lie detection is just one of the controversies surrounding neuroscience, one ethicists say if we are careless with this technology, our most intimate fear of privacy may be violated.

UNIDENTIFIED MALE: We have to recognize that for the first time in human history, we are gaining the capability of actually being able to apprehend people's subjective thoughts.

MARGOT ADLER: But others say they are already helping people by using this technology. One psychiatrist says he's even helped failing marriages with neuroscience.

UNIDENTIFIED MALE: They were very upset because they wanted to be married and when they came to us we scanned both the wife and the husband. And what we found is that he had a very toxic looking brain.

MARGOT ADLER: Stay with us.

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MARGOT ADLER: This is Justice Talking where we make the connection between law and American life. I'm Margot Adler. Today we are talking about neuroscience and the law. Scientists began to explore cognitive neuroscience — how the brain enables the mind — only a few decades ago. But already, advances in the field have prompted some scientists to predict that neuroscience may one day dominate the American legal system. The potential reach of neuroscience has also prompted some to urge caution.

Paul Root Wolpe is a professor of psychiatry at the University of Pennsylvania. He's also a senior fellow at Penn's Center for Bioethics and sits on the advisory board of the Center for Cognitive Liberty and Ethics. Welcome to Justice Talking.

PAUL ROOT WOLPE: It's a pleasure to be here.

MARGOT ADLER: I know you've written about mental privacy. What do you mean by this and why is it important for us to understand it?

PAUL ROOT WOLPE: We have to recognize that for the first time in human history, we are gaining the capability of actually being able to apprehend people's subjective thoughts.

Throughout most of human history, if you wanted to get some kind of information from me, you got it entirely through language, body gesture, blushing of the face, perhaps even heartbeat. These are all parts of the peripheral nervous system. But you could get no information at all directly from my brain. Now for the first time in history, using things like brain imaging, we can actually begin to peer into the workings of the brain itself and gather information from people that they may have had no intention of otherwise giving us. And that raises a new set of questions about what we really mean by privacy.

MARGOT ADLER: So if we're going to use these brain imaging technologies as sort of lie detections technologies, explain in a little more detail how they really challenge our privacy.

PAUL ROOT WOLPE: Well, lie detection is just one of the many uses that brain imaging can be put to, to the challenge our technology. So first we have to ask ourselves, do we really want a good lie detector? If we're only talking about lie detection. Societies throughout history have depended on lies for a variety of important social functions, not just the bad stuff, not just hiding criminality. But the ways in which societies interact are often based on systems of acceptable and even expected lying.

MARGOT ADLER: Sort of the white lies that we tell each other, or, you know, oh you have a beautiful baby, when the baby isn't so beautiful, and stuff like that?

PAUL ROOT WOLPE: Exactly right. And our culture isn't particularly lie-oriented. In addition, do you really want to have all of your, your most deeply guarded secrets, your, um, lies perhaps even that you tell yourself, your false memories, do we want all of this laid bare? Now, let me point out that right now we're not about, to undermine lying. Our technology does not yet allow us to tell with great, um, depth whether someone is lying or not, but we're getting closer.

MARGOT ADLER: You've specifically written about how this new technology raises all kinds of questions around the Fifth Amendment. Let's first of all remind people what the 5th Amendment actually says and what it is.

PAUL ROOT WOLPE: Well, what the Fifth Amendment does is it gives us the right not to incriminate ourselves through testifying. Um, there are many other ways that we can be forced to incriminate ourselves, but we cannot be forced to testify against ourselves.

MARGOT ADLER: So what are some of the concerns that you have around the 5th Amendment and these new technologies?

PAUL ROOT WOLPE: The Supreme Court has had to decide a number of times what is "testimony." So, for example, if my blood or a hair sample or a semen sample or a DNA sample would incriminate me, I cannot withhold them under the Fifth Amendment. The courts have decided that these are not testimony and therefore they can be compelled to be given to the court. So let's take an example like a diary. I've written a diary for a long time. It's in my desk drawer. The police seize it. And I say, well, you can't use my diary. That's testimony. That's me testifying about myself so I want that withheld from the court. The courts have decided that in fact that's not testimony. That testifying is an act. And so I sit speaking. It's gesturing. It's

anything that in the moment forces me to indicate some piece of information through action or words. Now let's imagine that some piece of information like that is in my brain. And I'm lying there in a brain scanner. I'm not moving. I'm not speaking. I'm not gesturing. The Supreme Court could theoretically say, that's not testimony. That's not testifying and therefore it is not protected by the Fifth Amendment.

MARGOT ADLER: Paul Root Wolpe is a professor in the department of psychiatry in the University of Pennsylvania. He's also a senior fellow at Penn's Center for Bioethics and sits on the advisory board of the Center for Cognitive Liberty and Ethics. Thank you so much for talking with us.

PAUL ROOT WOLPE: Well, thank you.

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MARGOT ADLER: Ethicists like Dr. Wolpe are taking a long view on the implications of neuroscience, but some in the private sector say it's not too soon to take the technology out of the research lab.

Dr. Daniel Amen is a psychiatrist and director of the Amen Clinics. He's also the author of several books, including "Change Your Brain, Change Your Life and Making A Good Brain Great." Amen has been criticized for using brain scans which cost thousands of dollars in his private practice. But, Dr. Amen, you say you're using this technology and helping people with it. Let's explain to listeners briefly what you do at the Amen Clinics. You use SPECT Imaging which is a specific type of brain scan to diagnose and treat mental health and behavioral disorders. Can you give us some examples of clients you've treated and tell us what you did for them that a regular psychiatrist couldn't do. What's special about your approach?

DANIEL AMEN: Well, what we do is really very different than most of our psychiatric colleagues. And that is, we really believe we should be looking at what we do before we do it. So, for example, I saw a couple that failed marital therapy. They got an F. They went for three years, spent $25,000 and at the end, the therapist said, get divorced, I can't help you. And they were very upset because they wanted to be married. And when they came to us we scanned both the wife and the husband. And what we found is that he had a very toxic-looking brain. And what you see on the scans is overall decreased activity in his brain. It's the same pattern that we see with people who have problems with alcoholism or drug abuse. But he said he never used drugs and he never drank. And what we found is that he was working in a furniture factory, basically being poisoned by the fumes that he was inhaling as part of his work. And doing marital therapy with a brain that doesn't work right, it just doesn't work. It's ineffective.

MARGOT ADLER: So did he leave the factory? What's the ... ?

DANIEL AMEN: He did. He went to another job in the factory and we really had to spend time working to heal his brain.

MARGOT ADLER: Now, you've been pretty outspoken in your criticism of conventional psychiatry.

DANIEL AMEN: You're right.

MARGOT ADLER: And you argue that using the type of brain scan that you use is more effective when treating patients — talk about that.

DANIEL AMEN: Well, I often say now I've been a psychiatrist for 25 years and I was a psychiatrist for 9 years before I ever ordered a scan. And I spent — and I love being a psychiatrist — but I spend a lot of time very frustrated because when I would do traditional things for my patients, things I was taught to do, um, they often backfired. And so I started ordering it on my patients. I mean I didn't invent it. And it was so helpful. I had a little boy. He was my third case I scanned. A little boy who had been hospitalized three times for violence and he had been put on Ritalin, made him worse. He'd been put on an antidepressant. It made him worse. And when we scanned him, we found he had an abnormality in a part of the brain called your temporal lobe, on the left side. And I had no clue what an abnormality in that part of the brain would mean, and so I went to the medical literature. And I found on SPECT scans, when you see this kind of abnormality it's often associated with people who have seizure disorders. And I went hmm. So I put him on an anti-seizure medication and all of the violent episodes went away.

MARGOT ADLER: What are the misconceptions people have about what you do?

DANIEL AMEN: Well, the first misconception is we use scans to make diagnoses and that's just not true. We use them in conjunction with the clinical information. They also say that we use unproven recommendations or treatments, like, I'd loved getting you to eat healthy and to exercise and to meditate, and I would rather use supplements, nutritional supplements, to treat your depression than medication if I can do it. And, you know, and I'm smart, so if I have a suicidal patient that's really depressed, odds are I'm not going to start with St. John's wort. But if I have somebody in the moderate, mild to moderate category, I very well may because those kinds of things work. And one of the things the scans have taught me is a lot of our medications are toxic to patients. I just had a conversation with a mother who's so anxious and she wants to take Xanax. And I know Xanax, for example, works in the brain just like alcohol does, and over time the brain scans take on a toxic look. People are less anxious, no question, but they're also not as smart. And so I really want her to learn relaxation techniques. So it's that more sort of whole-person approach that interestingly, The New York Times Magazine did a story on me and they called it snake oil. And I said but did you know, snake oil is high in Omega-3 fatty acids, which could be a good thing?

MARGOT ADLER: [LAUGHS] Dr. Daniel Amen is a psychiatrist and director of the Amen Clinics. He's also the author of several books, including "Change Your Brain, Change Your Life" and "Making A Good Brain Great." Thank you so much for coming on our show.

DANIEL AMEN: Thanks. Anytime.

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MARGOT ADLER: Dr. Amen says neuroscience is part of his whole-person approach to treatment, but researchers using neuroimaging to study mental illness say so far they only trust using the technology with large groups, where pools of data can be tested. Helen Mayberg is a professor of psychiatry and neurology at Emory University. Welcome to Justice Talking.

HELEN MAYBERG: Nice to be here.

MARGOT ADLER: Dr. Mayberg, for almost two decades, you have been using brain scans in your study of patients suffering from clinical depression. What has the use of brain imaging meant for you as a neurologist in your approach to studying brain diseases?

HELEN MAYBERG: What we and many of my colleagues have been doing now for umpteen years is to really try to characterize the brain in the depressed state, and then take advantage of the fact that you can study many, many people, characterize them very carefully, and look at whether or not they have a consistent scan pattern. And then go further to take those same patients before they're treated and look at how treatment impacts on how the brain is functioning. And to work step-by-step, experiment by experiment, to characterize those brain areas, and then the combination of brain areas that seem to be important to the depressed state.

MARGOT ADLER: What kind of implications do you think this technology will have on society's impression of mental illness?

HELEN MAYBERG: Well, I think it's already had an obvious change. I've noticed that every time we have a paper come out. I mean, not only do studies of looking at different treatments help people very simply to say, oh, it really it is in your brain because there it is. There's an area of the brain that is overactive, an area of the brain that's underactive. Gee, it's not just in my head. Well, it is in your head. It's in your brain. And it's, it's so obvious to a clinical neuroscientist that these are brain diseases, but to the public, or to patients that suffer from people saying look, you know, just snap out of it, you know, just suck it up. You would if you could. The reason you can't is because your brain is not cooperating.

MARGOT ADLER: If you were going to be asked right now what you see as the limitations of brain scans, what would you say?

HELEN MAYBERG: Well, first of all, is access, and (b) the kinds of scans that we've done, a lot of our many years of work, work well in groups of patients but aren't optimal for looking at individual patients. And, you know, one of the other monkey wrenches in all of this is a lot of the variability is now being tested by studying genetics. And so there are genetic variables that actually can introduce variations in brain scans that can track with the illness, but may not be illness markers. And this becomes important for understanding why are healthy people different from one another? Why are some people shy? Some people more assertive? Why are some people more open? Some people more retiring? We're learning more about how genetic variations in healthy people translates to differences in brain scans and difference in neurobiological markers.

MARGOT ADLER: There's this feeling when we, again, as a lay person looks at this they say, well, it's not exactly like using a brain scan to detect cancer, a lesion, a tumor, etc. And so the question is, are we going toward a place that mental illness can be detected in the same way cancer can be detected? You know, will bipolar disorder and depression be seen as no different than, you know, heart disease?

HELEN MAYBERG: On my most optimistic days and kind of what drives my research and the research of many others is yes, in fact, that will be true. I mean, one of the problems we have in psychiatry is that it's not yet evidence-based, like we use different treatments and other aspects of medicine. We don't know in psychiatry who might be best treated with cognitive therapy or drug. We use them consecutively or depending on what kind of caregiver you see. And that's not a problem except if it takes six to eight weeks to try out a treatment, or cognitive therapy 16 weeks — being in the throes of a major depressive episode any longer than necessary isn't great; that is tremendous suffering. Which means that if you could know the point you make a diagnosis, what is the most efficient and likely efficacious course of action based on data, that would change the practice of psychiatry. And, better, if you could identify, and this is extremely important to my group's work — who are those patients that don't get better? It may be as we study people so chronically, that the marker set we see that are unique in the brain scans to these resistant patients, that may turn out to be a marker that we can see when you present for the first time with your first depression. And that would change the course of how we manage patients.

MARGOT ADLER: That was Helen Mayberg, professor of psychiatry and neurology at Emory University. What precautions, if any, should there by on the application of neuroscience? Tell us what you think at JusticeTalking.org.

While you're there, you can check out our blog where many of the nation's leading commentators give their views on law and American life. Thanks for listening, and join us next week on Justice Talking. I'm Margot Adler.

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