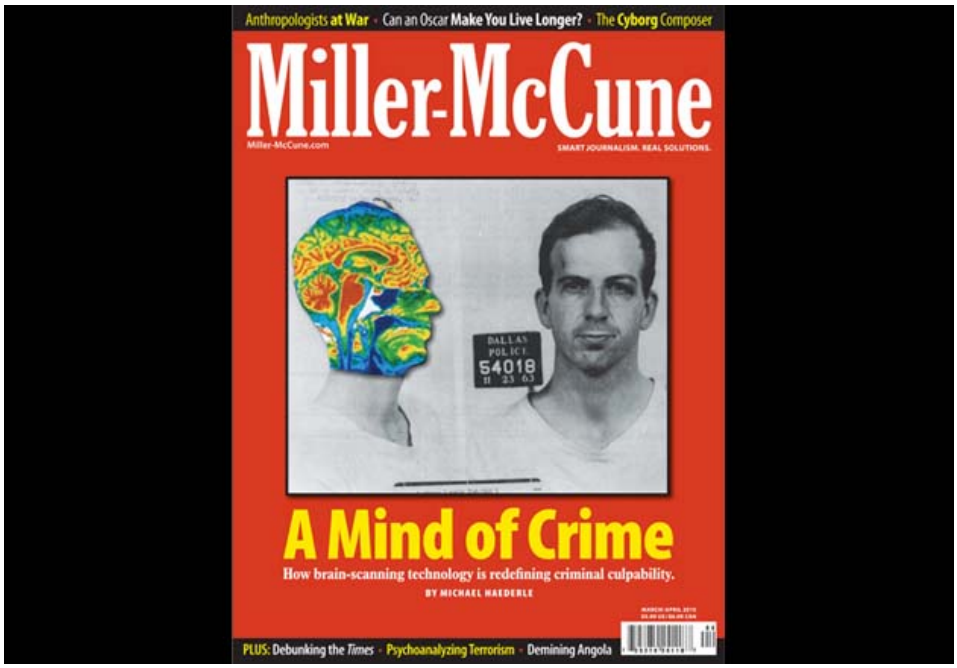
A Mind of Crime

How brain-scanning technology is redefining criminal culpability.

Will the new neuroscience undermine our legal system? Brain-scanning technology is redefining criminal culpability.



February 23, 2010 • By Michael Haederle

Kent Kiehl, a prominent neuroscientist hired to study an admitted murderer named Brian Dugan, had already been under cross-examination in the hushed, wood-paneled suburban Chicago courtroom for more than an hour when a brain diagram, hatched with X's, was projected on a screen. The X's marked areas where Kiehl had discovered abnormally low grey matter density in Dugan's brain. In a curious meeting of law and neuroscience, those X's would help jurors decide whether he should be executed or sentenced to life in prison. Did the way Dugan's brain had developed leave him spring-loaded for violence? Or had he chosen freely when he abducted, raped and killed a 10-year-old girl in 1983?

Defense attorneys had brought in Kiehl and other experts to prove that Dugan was a psychopath incapable of experiencing normal emotions like remorse, in hopes the jury could be persuaded to sentence him to life in prison, rather than death. Kiehl has interviewed and used new technologies to scan the brains of more imprisoned criminals than anyone else in the world. Here, he was asking jurors to accept that the brains of some criminals are simply different from the norm and that those differences should be considered during sentencing. "There are abnormalities in his brain function," the tall, broad-shouldered Kiehl told the jury. Psychopaths make choices, he acknowledged, but "those choices are not necessarily informed by emotion in the same way ours are."

The hearing last fall marked the first time Kiehl, an expert in functional magnetic resonance imaging brain scans, had testified in court, and his presentation may well have been the first time fMRI had been used in this way. It was also a classic example of the conflicts that arise when law and neuroscience — disciplines that make competing claims about human nature — intersect, as they increasingly do.

The law sees people essentially as rational actors, capable of forming intentions, weighing the consequences of their actions and controlling their behavior. As old as civilization itself, the law is inherently conservative, circumscribed by rules and precedent, and rooted in ancient notions of morality and justice. The law is clear: Those who break the rules we have collectively agreed upon make a choice, and those poor choices should be punished. Change in the law usually comes slowly and incrementally, in an orderly interplay of legislation and appellate decision-making that may embrace changing social and scientific norms long after they have gained currency elsewhere.

Neuroscience, on the other hand, is a runaway train of change. Armed with high-tech investigative tools like fMRI, diffusion tensor studies and positron emission tomography (PET) scans, neuroscientists over the past 30 years have made increasingly provocative — and to many, unsettlingly broad — assertions about who we are and how our brains operate.

A core tenet of the new neuroscience is that there is no single place inside our brain where free will is exercised and a kernel of "self" resides. Instead, the science suggests, the mental states we experience are like a mirage, arising from highly complex interactions of myriad brain systems involving electrical signals that are governed by the laws of physics. It is a highly mechanistic model that many believe ultimately denies that free will is truly free.

Meanwhile, neuroscientists are detecting ever-more-subtle differences in brain functioning with their scans. They can see the telltale signs of schizophrenia, bipolar disorder and post-traumatic stress disorder. Now Kiehl has added psychopathy to the list of conditions that can be observed in the scans.

Where the law would have us assume that nearly everyone has the capacity to judge and control his or her behavior, neuroscience is saying that isn't necessarily true.

This scientific assertion raises profound questions: If all our mental states can ultimately be reduced to neuro-physiological brain states, and there is really no such thing as free will, how can people be held accountable for criminal behavior? What would it even mean, in neurological terms, to form an intention or act according to reason? "It's really an old idea," observes Joshua Greene, a Harvard University psychologist, philosopher and neuroscientist who studies law and morality. "This goes back to the pre-Socratics. Once people got the idea, 'What if it's just atoms, it's all just physical stuff?' they asked, 'How do we make sense of choice? How do we make sense of responsibility?'"

Most people don't ponder such questions too deeply until a case arises involving addiction, brain damage or other mental impairment, because then a person's ability to control his behavior is called into question. "You very quickly get into these philosophical problems, where you say, 'OK, why do we want to say the psychopath is still responsible?'" Greene said. These theories of brain function and neuroimaging techniques are already making themselves felt in many areas of the law, as scientists produce enhanced brain images that are dramatically highlighted with vivid hues indicating areas of heightened or suppressed brain activity. Many legal experts agree the influence of neuroimaging is bound to spread. Suppose a neural scan could determine whether someone was in a vegetative or minimally conscious state? What if an fMRI could objectively measure the degree of pain and suffering someone was experiencing in a personal injury case? Neuroimaging might even be used to measure a criminal's risk of recidivism or, conversely, the extent of his rehabilitation. And the time may not be far off when a neural scan will substitute for conventional lie detectors. Right now, the question is whether they can be used to establish — or rule out — a criminal state of mind.

Kent Kiehl has notorious serial killer Ted Bundy to thank for his career on the cutting edge of forensic neuroscience. He grew up in the same Tacoma, Wash., neighborhood as Bundy, who presented a preppy, well-mannered exterior while he abducted, raped and murdered as many as 35 young women in the 1970s. Even as a child, Kiehl was fascinated by the question of why psychopaths act as they do.

When a knee injury ended his dreams of a pro football career, the young pre-med student at the University of California, Davis, turned his attention to neuroscience. After graduation, he moved on to the University of British Columbia to study with Robert D. Hare, widely recognized as the world's foremost expert on psychopathy.

Hare had created a well-known screening device called the Psychopathy Checklist-Revised (PCL-R), which trained clinicians to interview someone, review his or her history and assign points for various traits. Subjects scoring 30 or above on a scale of 40 are considered to be psychopaths. (Normal subjects usually score a 4 on the checklist.)

Hare sent Kiehl off to a maximum security prison outside Vancouver to screen the inmates with the checklist. Intrigued by the newly emerging technology, Kiehl started using fMRI scans alongside the checklist as he sought to better understand how psychopaths' brains differed from those of normal people.

Kiehl, who later did postgraduate work at Yale University, was recruited in 2006 by the nonprofit Mind Research Network to become a principal investigator, in collaboration with the University of New Mexico, which offered him a teaching position. He was lured in part by the promise of being able to use a newly purchased portable fMRI machine to scan prison inmates. With his broad, unlined face and blue-green eyes, Kiehl looks younger than 39, and he speaks about his research with unabashed enthusiasm. I met him in his office in the new Mind Research Network complex, which overlooks a golf course in Albuquerque. Kiehl has an unobstructed view of Mt. Taylor, looming 70 miles away on the western horizon.

Kent Kiehl in front of the semi-trailer that houses a portable MRI scanner at the Western New Mexico Correctional Facility. Click the image to see a cutaway of the trailer and one view of the scanner.

Every morning, students and staff from his lab jump into twin Toyota Priuses and drive to Grants, a town that sits along the mountain's southern slope. Grants is home to the Western New Mexico Correctional Facility, a 428-bed medium security men's prison. Inside the prison yard, the long, white semi-trailer that houses Kiehl's $2.3 million Siemens MRI scanner sits surrounded by high walls topped with concertina wire.

Inmate volunteers are escorted to offices to meet with members of Kiehl's team, who conduct intake interviews. A much more thorough background review follows, which includes a battery of psychological tests and the assignment to each inmate of a PCL-R score.

Then researchers put each inmate inside the long, tunnel-like MRI scanner and study the inmate's unique brain structure. On a second scan, they ask him to respond to a battery of images and morally provocative words and phrases — like "abortion" and "sex with your mother" — while the machine measures blood flow in different areas of his brain. The results are matched against those from non-psychopathic inmates, as well as a control group composed of people who have never been convicted of a crime. As a bonus, the prisoners are given copies of their brain scans as keepsakes.

Kiehl is exploring a hunch that psychopaths suffer from deficits in their paralimbic system, a network of brain structures associated with memory and the regulation of emotion. "We're testing the hypothesis that there are developmental differences associated with psychopathic traits," he told me. "The more severe the traits, the more severe the impairment in the paralimbic system. We're trying to understand how did it get that way and what are the best potential ways of intervening to correct it."

The scans show that the psychopath's brain does indeed look different from others. "This shouldn't really surprise people," Kiehl said. "When your behavior is very different, your brain is different." He estimates that 15 to 20 percent of prisoners in minimum to medium security prisons qualify as psychopaths, while the figure might run as high as 30 percent for those in maximum security.

But Kiehl, whose work at the prison is being carried out with funding from the National Institute of Mental Health, The John D. and Catherine T. MacArthur Foundation and the National Institute on Drug Abuse, is not content simply to describe and diagnose a misunderstood brain disorder. He also hopes to make predictions about how psychopathy will affect future behavior, as well as to monitor and perhaps guide therapeutic interventions.

Kiehl often speaks faster than seems humanly possible, his mind clicking along with computer-like precision, even as he obsessively checks his iPhone for messages. But he is also charming; he has a knack for creating a companionable rapport with convicts — something that he admits he sometimes finds troubling. “They’re like undergraduates,” Kiehl said of his imprisoned study subjects. “They love getting pictures of their brain. It’s very cathartic for them to come talk to somebody for six or eight hours.” The participants cooperate because they know one of the goals of Kiehl’s research is to figure out how to keep them from reoffending, he said.

Psychopaths typically exhibit impulsivity, poor planning, little insight and an utter absence of guilt or empathy, Kiehl said. “They say, ‘I don’t get this remorse. I don’t even understand what you mean. I don’t know what it feels like. I have never had those kinds of emotions.’”

Psychopathy seems to start early in life and may even be an innate condition, said Kiehl, who has also been collaborating with other Mind Research Network scientists in genomic studies to study the possibility. “I’ve never met a psychopath who didn’t start his career extremely early,” he told me. “Most psychopaths that we’ve studied, they’ve been like that since they were 4 or 5 years old.” Most had engaged in sexual activity by the age of 12 and showed early signs of violence, including a predilection for arson and animal torture, he said.

Kiehl thinks it’s absurd to execute convicted murderers who have malfunctioning brains. “It’s kind of like telling a patient who has dyslexia to go read Faulkner, or something really difficult,” he said. “They have no chance, but you’re going to punish them because they can’t read?”

Despite what most people might assume, Kiehl believes psychopathy is potentially treatable. He points to an innovative program in Wisconsin that provides young offenders intensive round-the-clock supervision and successfully keeps many of them from reoffending. Could those results be replicated in adults? “It is, I think, a manageable condition in the adult, and I think it is treatable condition in youth with the current state of knowledge,” Kiehl said. He believes his research may one day yield an effective treatment for adults as well.

Kiehl and his team are also using their access to the New Mexico inmates to conduct a large trial to treat substance abuse. (Prisoners are at their highest risk for drug overdose and relapse immediately after their release, he notes.) In the trial, prisoners undergo 12 weeks of intensive one-on-one talk therapy; brain scans are made before, during and after treatment. Kiehl wants to see whether their brains will show signs of change from the treatment and whether that change is long-lasting.

Kiehl gained widespread attention outside the scientific community when he was featured in a 2008 *New Yorker* story. “I have had half a dozen prominent attorneys call me and say they want to do functional imaging of their client, who is a psychopath, to try to show that his brain looks different, because prosecutors will likely take the death penalty off the table,” Kiehl said.

The earlier introduction into death penalty proceedings of other forms of brain imaging, such as PET scans, has raised the stakes, while sparking a backlash from judges and prosecutors who question the validity of neuroimaging and its probative value in court. Kiehl acknowledges there are limits to the science. “I’m happy to tell them what it can and can’t do,” he said. “I can’t look at it and tell you this is how his brain looked at the time of the crime. But I can tell you that of the thousand inmates that we’ve scanned, when they were younger, they looked the same as when they were older. So it suggests that his brain looked like this when he did the crime, and it suggests his brain has looked like this since he was 5 years old.”

Much of what passes for accepted forensic science, including fingerprint analysis, blood spatter evidence and the like, has never been subjected to the rigorous scientific testing that fMRI is undergoing, Kiehl said. He believes it will one day be accorded the same respect as DNA evidence, which is now considered to be the scientifically irrefutable gold standard of forensics.

Neuroscience has been threatening to undermine the pillars of free will and responsibility upon which our legal system rests for some time. Barely a generation ago — the "old days" in the fast-moving world of neuroscience — researchers mainly relied on anatomical studies and electroencephalography to try to understand what was going on inside the brain.

Electrodes were placed on subjects' scalps to record brain waves as a way of measuring neural activity.

In 1977, Benjamin Libet devised cleverly designed experiments at the University of California, San Francisco, that detected activity in the motor cortex of subjects nearly half a second before they became conscious of their decision to press a button. This suggested to many that free will was an illusion, although Libet also showed that there is a brief window of time in which the conscious mind can still veto an action before it is taken. These and other experiments reinforced the notion that much of what goes on in our brain takes place outside of conscious awareness (itself a mysterious artifact of myriad neurons firing in an intricate bioelectric symphony).

Then, in 1982, John Hinckley Jr.'s lawyers had his brain scanned using computerized tomography — essentially a high-tech X-ray imaging technique. The CT scans showed he had unusually large brain ventricles, which, they suggested to the jury, affected his behavior when he shot and wounded President Ronald Reagan and two others in an assassination attempt. The jury found Hinckley not guilty by reason of insanity.

The tools became more refined in the 1980s, as PET scans were used to image the brain with the help of short-lived radioactive tracers. A decade later, MRI came into widespread use, allowing more fine-grained resolution of brain structures. MRI scanners use powerful magnetic fields to align the hydrogen atoms in the body's water molecules without exposing subjects to radiation. Functional MRIs, developed in the early 1990s, enabled researchers to see the brain's changing demands for oxygen, a measure of which areas were most metabolically active. Scientists could now see on a screen which part of a subject's brain "lit up" while he or she performed a specific task.

Around that time, a retired New York advertising executive named Herbert Weinstein was charged with second-degree murder for strangling his wife and throwing her body out the window of their 12th-floor apartment to make it look like a suicide. Before trial, his lawyers produced evidence that Weinstein had a sub-arachnoid cyst in his brain, the implication being that the defect had somehow caused his homicidal behavior.

Shortly after the judge decided to admit some of that evidence at trial, prosecutors agreed to let Weinstein plead guilty to manslaughter. That decision was interpreted by many as an acknowledgement that a jury might well have found the neuroscientific evidence persuasive.

More recently, neuroscientific evidence was offered in *Roper v. Simmons*, a case leading to a 2005 U.S. Supreme Court ruling that said defendants could not be executed for crimes committed while they were juveniles. Amicus briefs submitted by the American Medical Association and the American Psychological Association cited neuroimaging studies that showed frontal-lobe structures, which are responsible for self-control, typically were not fully developed in juveniles.

Meanwhile, two recent ventures — San Diego-based No Lie MRI Inc. and Cephos Corp. of Massachusetts — have begun offering fMRI-based lie detection, building on work initially carried out by the University of Pennsylvania's Daniel Langleben and others. The technology is based on the theory that a subject's brain shows distinctive patterns of activation when he or she tries to conceal the truth. Although neural lie detection promises to be more reliable than polygraph evidence, which is based on technology that has been around for nearly a century, it has yet to gain acceptance in the courtroom.

In 2007, the MacArthur Foundation decided to commit $10 million to create the three-year Law and Neuroscience Project, an interdisciplinary effort to unite scientists, law professors, judges and philosophers in studying how to integrate new neuroscientific findings into the legal system. The project is headquartered at the University of California, Santa Barbara, where its director, prominent cognitive neuroscientist Michael Gazzaniga, heads the SAGE Center for the Study of the Mind. Kiehl and Joshua Greene (with whom Kiehl has collaborated) are also members of the MacArthur Foundation project. But does neuroscience really undermine traditional legal concepts in the way its proponents claim? Or does the law simply need to be adapted to new technology, as has been done for DNA and other science?

Deborah W. Denno, a Fordham University law professor, has studied provisions of the Model Penal Code, a template upon which many states base their criminal laws, as it relates to criminal culpability. She finds it lacking in light of contemporary neuroscience, particularly when it asks whether defendants acted voluntarily or involuntarily. “Consciousness is not this all-or-nothing thing,” Denno told me. “It’s in degrees. Everyone’s pretty much going to agree with that. Nevertheless, the criminal law depicts it as an off-on, all-or-nothing concept. This really distorts the process.”

An example of involuntary or unconscious behavior might be a crime committed while sleepwalking, one of the few cases in which the law does not hold a defendant responsible for his conduct. In November 2009, for example, a British court freed Brian Thomas, a man with a history of sleepwalking, because it concluded that at the time Thomas was strangling his wife, he was dreaming he was holding an intruder in a headlock.

Denno said the current scheme punishes some people too severely and others not at all. She advocates a more nuanced approach that would create an intermediate category of “semi-voluntary” culpability. Yet many legal scholars don’t want to hear about neuroscientific findings, she said. “All of a sudden there’s a hesitation, where they say, ‘The science is new, and we don’t really know enough,’ in a way that you would never articulate for any other kind of decision-making. The argument I’m making is, ‘What we have now is really problematic. Is what we have now better?’”

The Model Penal Code, which was completed in 1962, reflects outdated concepts from Freudian psychology that were popular in the mid-20th century but have now largely been discarded, Denno contends. But juries today increasingly are familiar with the new paradigm and are capable of understanding more scientific arguments and evidence in the courtroom. “You see articles on neuroscience in the popular press all the time,” she said. “Certainly people look at the human mind and human behavior differently, based on all that they’ve been reading about neuroscience.”

Harvard’s Joshua Greene agrees that as people become more familiar with neuroscience, they will come to expect that our codes on crime and punishment reflect scientific understanding. Greene was still a graduate student at Princeton University when he co-authored a 2004 essay with Jonathan D. Cohen titled, “For the Law, Neuroscience Changes Nothing and Everything.” The paper identified two alternative theories of criminal liability. The retributivist approach, which dominates the current criminal justice system, embodies the familiar idea of giving people what they deserve. The consequentialist argument is that punishment is “merely an instrument for promoting future social welfare,” they wrote.

Over time, they argued in the paper, neuroscience is bound to erode “folk psychology” — the common-sense but scientifically unfounded notion of free will that forms the foundation for the retributivist model. “When you try to come up with principles that really make sense of your intuitions about these kinds of cases, you find yourself very quickly rubbing up against that old, stubborn problem of making sense of choice and freedom and responsibility in a clockwork universe,” Greene said.

He and Cohen proposed recasting the law from a consequentialist perspective, which would not require free will as an element of criminal liability. It would still permit punishment for crimes but rest on a sound scientific underpinning. Greene knows that his theorizing encroaches on legal scholars’ turf, and his views are anathema to many of his MacArthur project colleagues. “They’re personally very nice to me,” he said. “They consider it an interesting discussion to have, but they think that I’m dead wrong.”

One of Greene's chief critics is Stephen J. Morse, a professor of law and neuroscience at the University of Pennsylvania and a co-director of the MacArthur project who happens to combine his legal expertise with a doctorate in psychology. Morse has dissected some of the more expansive claims of neuroscience with a mix of philosophical disputation and broad satire.

"Consciousness is maybe the hardest problem in science," Morse told me. "There is an enormous amount these days of what I call 'neuro-arrogance,' which is to make claims based on an implicit view that we understand much better than we do the relationship between brain and behavior, and brain and mental states."

Meanwhile, Greene and Cohen's notion that we are merely victims of neuronal circumstances — the claim for the "disappearing person" — is a vast overclaim, given the current state of research, Morse said. He also disagrees that current theories of criminal liability presume that we exercise free will. All the law really requires, he says, is a general capacity to understand and follow rules. "The law doesn't really ask a lot of us," Morse said. "How hard is it to know that you shouldn't kill people, you shouldn't rape people, you shouldn't burn buildings that aren't yours, and you shouldn't take what doesn't belong to you?"

Morse contends that cognitive neuroscientists are apt to make too broad a leap from their laboratory findings. "What I often say to the neuro-claimers is, 'Translate this neuro-evidence into the legal criteria,'" Morse said. "Show me precisely how that works. What's the mechanism? After all, frontal lobe dysfunctions don't do things: People do things. How does this frontal lobe dysfunction convert into 'He didn't know right from wrong,' or 'He couldn't form the intent to act?'"

The cognitive neuroscientists "are assuming that your mental states are nothing but your brain states," Morse said. "Now, it may turn out that that will seem to be the case, but we don't know that."

Despite his skepticism, Morse readily concedes neuroscience could illuminate and modify some areas of the law, just as other kinds of scientific research have done, but it is unlikely to be a game-changer. "Sure, we can refine our categories," he told me. "Sure, we might learn things that would lead us to believe that some of our doctrines are not very sensible. Sure, if the neuroscience gets really good, we may be able to make individual case decisions in a more accurate way."

All these, he says, "accept the human being is the kind of creature we think we are. They all accept that the legal system is going to be able to continue using the folk-psychological approach." Meanwhile, it is unclear just how often neuroimaging is being used in courtrooms, Morse said. It is seldom used in non-death penalty cases because neuroimaging remains extremely expensive.

As it is, trial judges sometimes admit neuroscientific evidence without really understanding what it means, Morse said. "Judges often will think something is relevant, but maybe it's not if they actually thought it through," he says. "The issue is always you're going to have to show how neuroscientific evidence answers an actual legal question."

Neuroscientific expertise may also become a double-edged sword that could be used against defendants, he warns. "There are going to start to be prosecution experts who are going to come in and tell the jury why this doesn't have the implications that the defense claims," he said. "Rather than being mitigating, for example, evidence of brain abnormalities might be aggravating because they will indicate that the defendant is particularly dangerous."

Brian Dugan's case could make for an entire chapter in the history of botched prosecutions. It had been playing out in Illinois courtrooms for 25 years before Kiehl testified last November.

Mug shot of Brian Dugan from 1970.

Born in 1956, Dugan was only 18 when he started trying to abduct and rape girls and young women. For years he was mainly known to police in the western suburbs of Chicago for lesser crimes, like arson, battery, criminal damage to property and burglary. Dugan spent three years in prison, and following his parole in 1982, he resumed his one-man crime spree, this time turning homicidal.

It was in February 1983 that he abducted and murdered 10-year-old Jeanine Nicarico, although he would not be charged for that crime for more than 20 years. In July 1984, he raped and murdered Donna Schnorr, a 27-year-old nurse, after running her car off the road. More sex crimes followed later that year. In June 1985, Dugan raped and drowned 7-year-old Melissa Ackerman.

Arrested a day later, Dugan has been incarcerated ever since. He pleaded guilty to the Schnorr and Ackerman murders in return for life prison sentences. Late in 1985, Dugan confessed to his attorney that he had killed Nicarico. But when they learned of the confession, police and prosecutors in suburban DuPage County discounted his story.

Prosecutors had focused on two other men, Rolando Cruz and Alejandro Hernandez, as the killers. Both were convicted and sent to death row. In the course of convoluted appeals over the next decade, Cruz and Hernandez twice saw their convictions overturned. Finally, at Cruz's third trial, in November 1995, a police witness recanted his earlier testimony, and Cruz was acquitted. The defendants later received a substantial cash settlement from the county for wrongful prosecution. Three prosecutors and four sheriff's deputies were charged with hiding exculpatory evidence – in effect framing the men – but were later acquitted.

After all this, prosecutors finally started to take Brian Dugan's claims seriously. A DuPage County grand jury indicted Dugan for the Nicarico murder in 2005. He entered a guilty plea to charges of kidnap, rape and murder in July 2009. With Dugan's admission, the only remaining issue was whether he would be sentenced to death or spend the rest of his life in prison. That led to a closely watched death penalty jury trial before George J. Bakalis, the circuit court's presiding felony division judge. The seven-week trial eventually included 77 witnesses and more than 400 exhibits.

Sitting at the defense table wearing a button-down shirt and khakis, the graying, bespectacled Dugan looked more like a mild-mannered clerk than a demonic serial killer as he scrawled notes to his lawyers on a legal pad. Joining him were the lead counsel, Steven Greenberg, a brash, gum-chewing Chicago lawyer who had handled a dozen death penalty cases and

seemed utterly at home in the courtroom, Matthew McQuaid, a brush-cut former prosecutor, and Allan Sincox, a state appellate defender respected for his knowledge of crime scene and DNA evidence.

The prosecution team was headed by State's Attorney Joseph Birkett, who, along with several of his deputies, had been living and breathing the Dugan case for years.

Early on, the defense team realized that the only hope it had of persuading a jury to spare Dugan's life was to show that he suffered from an "extreme mental or emotional disturbance." Accordingly, one of Greenberg's first calls was to Dr. James Cavanaugh, a distinguished forensic psychiatrist at Chicago's Rush University Medical Center. In 1981, Cavanaugh had served as an expert for the government in the Hinckley case and later helped the FBI develop its famed criminal profiling protocol.

In addition to interviewing Dugan and preparing a psychiatric assessment, Cavanaugh also brought in Kiehl, who traveled to Chicago in September 2009 to have Dugan undergo an fMRI scan at Northwestern University. He also spent several hours interviewing the murderer.

Before Kiehl testified, Judge Bakalis made a critical ruling: Kiehl could not show the jurors some of his most compelling evidence, including graphic images from fMRI scans that illustrated the workings of Dugan's brain. The defense team had pressed for admission of the novel scientific evidence, but Birkett had argued to the court that the color-coded images, which showed the distinctive pattern of Dugan's neural activation, would confuse or mislead jurors. Judge Bakalis split it down the middle: Kiehl could not use those particular slides, but he could use other, more general diagrams to illustrate his point.

In addition to the scans and PCL-R scoring, Kiehl had prepped for his testimony by reviewing Dugan's voluminous case file. And, reminded of his propensity to talk too quickly, he had pasted a note to his water bottle with a single word on it: "Slow." But before he took the stand early in November of last year, there was another round of wrangling over which images the jurors could see. Birkett repeated his claim that the fMRI pictures of Dugan's brain wouldn't tell the jurors anything they didn't already know. "It's as old as Cain and Abel," he said. "Everybody knows psychopaths process information differently — otherwise they wouldn't rape and kill."

Greenberg looked ready to blow a gasket. "This is a demonstration exhibit that experts use in thousands of cases every day," he told the judge. While prosecutors had been permitted to show jurors gruesome crime scene photos, the defense attorney said, "We can't show a picture with a few blue marks?"

Judge Bakalis reaffirmed his ruling, and finally, Sincox started the defense questioning of Kiehl, who described subjecting Dugan to the Hare Psychopathy Checklist, on which Dugan had scored 37 out of 40. "Brian is very unique," Kiehl said. "That puts him in the 99.5 percentile." Kiehl told Sincox that it might be possible one day to treat a psychopath like Dugan, a not-so-subtle message to the jury that they might want to spare the defendant's life so that he might be rehabilitated. On a screen, Kiehl projected a brain diagram with X's marking the areas in the paralimbic system where Dugan's brain had the low-grey-matter density characteristic of the psychopaths he had studied. Kiehl then recited the famous story of Phineas Gage, a mild-mannered 19th-century railroad worker who developed antisocial behavior after an iron rod was driven through his brain in an accident — an example of what he called "acquired psychopathy."

After taking Kiehl through the results of the various tests he performed on Dugan (which showed, among other things, that Dugan had problems controlling his behavior), Sincox asked whether Dugan had been suffering from psychopathy in the early 1980s, when he was committing his violent crimes. "Yes, absolutely," Kiehl said, adding that Dugan suffered from reduced mental capacity that amounted to "an emotional disturbance."

"Is Brian Dugan's brain a normal brain?" Sincox concluded.

“No, sir,” Kiehl answered.

In his cross-examination, Birkett quickly sought to undercut Kiehl’s contention that the differences in Dugan’s brain mitigated his behavior. Was Kiehl sure about the way he had scored Dugan on the PCL-R? Did Dugan’s criminal behavior affect the way his brain looked in scans? Was there a broad enough body of fMRI research, the prosecutor asked, to back up Kiehl’s claims about psychopathy?

Kiehl remained unflappable, but by the time he left the stand, the jury still had never seen an actual image of Brian Dugan’s brain.

Less than a week after Kiehl testified, the jury voted unanimously to impose the death penalty on Brian Dugan. At first, jurors returned a signed verdict indicating that the vote was 10-2 in favor of death; two people had been in favor of a life sentence. They only returned with the unanimous verdict required for a death sentence after they asked the judge for more time to deliberate, and he allowed them to spend one more night sequestered.

The jurors did ask to review the transcripts of the testimony from Kiehl and the other defense psychiatric witnesses, Birkett said, but they ultimately were not persuaded — and for good reason.

Birkett said New York psychiatrist Jonathan D. Brodie, the witness called by the state to rebut Kiehl’s testimony, “hit it out of the park” when he told the jury there was no way a brain scan conducted in 2009 could speak to Dugan’s state of mind at the time of the Nicarico killing. He also said Kiehl’s assertion that the brain differences in psychopaths like Dugan implied they are less able to weigh the consequences of their behavior didn’t pass the common-sense test. “That’s a crock,” he said. “They do in fact make choices. They do assess situations. This is a centuries-old debate about how do you define morality.”

Birkett doubts that fMRI evidence will become widespread in the courtroom anytime soon. “I don’t think you’ll see it much, and when you do, I think it’ll be impeached substantially,” he said.

Defense attorney Steve Greenberg submitted an 18-page post-trial motion that listed his many objections to the judge’s rulings. Greenberg predicted that there would be years of appeals, and one of the critical issues would be the judge’s decision to suppress Kiehl’s best graphic evidence — the actual pictures of Dugan’s brain.

Back home in New Mexico, Kent Kiehl continued his work with prison inmates while writing up a case study about Dugan (something the defense team had agreed to at the outset). Kiehl and a colleague were also genotyping Dugan’s DNA, the first time that has been done with a serial killer, in hopes of better understanding just what goes wrong as a psychopath’s brain develops.

Kiehl remains confident that lawmakers, legal scholars and judges will one day come to embrace neuroscientific evidence in weighing when and how to punish people whose brains don’t function normally. Meanwhile, he said, the cost for Dugan’s death penalty defense had already approached $1 million.

“I think it’s a terrible waste of money,” Kiehl mused. “Maybe as a society we shouldn’t be executing you because you have this difference.”

Comments

For many criminals there is no cure, but the fact that they hide their crimes shows they recognise that behaviour is unacceptable in wider society. The decision to hide shows a capacity to choose. While the compulsion to commit crime may be strong it is still a choice. There is arguably far too much lack of responsibility and accountability already in the legal process. Why is there so much focus on the criminal? Why should the perpetrator of crime be afforded more protection than victims and the wider society? The law is intended to protect the weak but now it often trips itself up in its own convoluted good intentions.

No neurophysiological 'finding' will ever show that choices are not made or that it is not possible to resist impulses (minimal requirements of "freedom"). If they did it would only demonstrate that the "brain" and the "mind" belong to two different universes of discourse, which is the refutation of reductionism.

Interesting. So we have a $2.3 million scanner and who knows how much federal funding for this guy to tell us psychopaths' brains are different, therefore we need to research this more. And we are horrible people for punishing psychopaths who know the difference between right and wrong. Seen the deficit lately?

Maybe drown them at birth. The problem is that these psychopaths do an incredible amount of damage to other people, always. That is what they do. And other people deserve to be protected from them, not allowed to be prey for a predator.

Let as all look forward to an advanced society where the crimanal justice system provides for an earlier identification of such patients ,thus eradicating the crime itself.
For many criminals there is no cure, but the fact that they hide their crimes shows they recognise that behaviour is unacceptable in wider society.
There is no doubt about the enormous damage done by people suffering from mental illness.Instead of blaming and concentrating on retribution it's time our society relises the need to cure them.Punishment is not the solution but finding a system for rehabilatation and treatment is.

Does knowledge of the structure and manufacture of pianos cancel the freedom of expression of improvising pianists? Does knowing of what an instrument (be it a piano or a hammer or brain) chemically consists make it less useable or effective?

Surely, once any 'thing' has been broken down (analyzed) into its constituents it must strike one as near miraculous that it should function at all. Such is the illusion created by analysis (the isolation of parts from a whole).
No neurophysiological 'finding' will ever show that choices are not made or that it is not possible to resist impulses (minimal requirements of "freedom"). If they did it would only demonstrate that the "brain" and the "mind" belong to two different universes of discourse, which is the refutation of reductionism.

No neurophysiologist in his capacity as a neurophysician (natural scientist) could ever maintain that the mind and the brain are one. Such a statement is metaphysical (or 'speculative' in the Hegelian sense). It is not a testable hypothesis, and must be taken on faith. Strange how so many scientists abandon their skepticism when it comes to asserting such an identity.

The distinction of universes of discourse is equivalent to the distinction between behavioral and geographical environment in Gestalt psychology. In the former we move and act and have our being, in the latter we are a collection of molecules negotiating a force-field characterized by such & such properties. Perspective is all.

"This scientific assertion raises profound questions: If all our mental states can ultimately be reduced to neuro-physiological brain states, and there is really no such thing as free will, how can people be held accountable for criminal behavior? What would it even mean, in neurological terms, to form an intention or act according to reason?" -- These questions only seem to be profound. If minds are merely what brains compute (as they indeed are), ethics and morality become quite transparently tractable. For details, see chapter 10 of "Computing the Mind: How the Mind Really Works" (S. Edelman, Oxford University Press, 2008).

Just because someone has no remorse does not mean they that they are unable to recognize the difference between right and wrong. Ted Bundy hid his crimes for many years precisely because he did know his actions if discovered would lead to negative repercussions for himself.
Maybe drown them at birth. The problem is that these psychopaths do an incredible amount of damage to other people, always. That is what they do. And other people deserve to be protected from them, not allowed to be prey for a predator.
If Kent Kiehl thinks his research is going to make people feel sorry for these pyschopaths, he's crazy. And perhaps Kent is one as well?

Oh please, this is just an excuse not to convict, and to allow them to continue preying on the rest of us. It should be remembered that they have no remorse -- and unless science can make them grow some then they will always be predators. Of course they behave themselves when they're being studied, that's the very nature of a psychopath. Good behavior while being tracked doesn't mean they suddenly grew a quantity of remorse.

Makes more sense to identify them early and have a public list, so normal people can be aware they're interacting with a pyschopath. Perhaps sterilize them, I certainly don't want them reproducing more. The amount of damage they do is astronomical.
If genetic psychopathy is often a result of brain abnormalities does that mean that they are not responsible for their own criminal behavior? If criminal behavior is mostly a product of biological and environmental causes beyond individual control, is "crime" anything more than a mental illness? SEE: Twilight of the Psychopaths, by Dr. Kevin Barrett

What a disturbing story. Our whole notion of justice needs to be overturned. Instead of focusing on punishment we need to focus on protecting innocent people from dangerous people like psychopaths. At the very least psychopaths need to be locked away or otherwise segregated away from the rest of decent society permanently. Then again, since psychopaths are in essence not human, lacking the features we regard as humanity (emotions, remorse, a conscience), where is the problem in putting them down like rabid dogs. Oh and a cure for psychopathy? Psychopathy is a genetic disorder. How can a genetic disorder be cured? You have as much chance of curing psychopathy as curing downs syndrome.