Nanotechnology and the Attribution of Responsibility

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ABSTRACT

To attribute responsibility, including criminal responsibility, one must use commonsense psychology. Commonsense psychology allows us to understand and predict behavior via attribution of mental states, and thus to asses the relationship between a person's desires and any harm they have caused. This article by Dr. Katrina L. Sifferd discusses how nanotechnological advances—particularly in neuroscience—may affect our commonsense attribution of mental states, and thus affect assessments of responsibility. Neuroscientific nanotechnology may have this effect by providing new information about the mental states relevant to responsibility, or by allowing us to alter, inhibit, or "implant" the mental states relevant to responsibility. Dr. Sifferd concludes that these possibilities of neuroscientific nanotechnology pose no unique threat to criminal responsibility except with regard to implantation of desires (the least likely possibility resulting from neuro-nanotechnology).

I. INTRODUCTION

To attribute responsibility, including criminal responsibility, human beings must use commonsense psychology. Commonsense psychology (CSP) is an innate capacity used by all normal human beings to understand and predict behavior.[1] CSP is a predictive, systematic, and explanatory framework that uses information perceived—such as facial expressions, environmental context, and statements made—and information manifested in the relevant mechanisms of the brain to generate interpretations and predictions of others' behavior. CSP allows us to interpret and predict behavior via attribution of two general kinds of mental states to those we are interpreting: desires and beliefs. (It is thought that autistics lack CSP.[2])

To give an example: from across the street I see a friend, Jane, sitting in a café with her boyfriend. She is crying, and slumped back in her chair with her arms folded in front of her. Jane will not make eye

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1 *See* WILFRID SELLARS, EMPIRICISM AND THE PHILOSOPHY OF MIND 127-96 (Herbert Feigl and Michael Scriven, Univ. of Minn. Press eds., 1956), *available at* http://www.ditext.com/sellars/ epm.html; *See also* JERRY A. FODOR, PSYCHOSEMANTICS: THE PROBLEM OF MEANING IN THE PHILOSOPHY OF MIND (1989); DANIEL C. DENNETT, THE INTENTIONAL STANCE (1987); SIMON BARON-COHEN, MINDBLINDNESS: AN ESSAY ON AUTISM AND THEORY OF MIND (1997).

2 *See* Baron-Cohen, *supra* note 1.

contact with her boyfriend, and when he tries to take her hand, she brushes him off. I would guess that at the very least that Jane and her boyfriend were having a fight, and that she possessed certain mental states in relation to the situation; maybe that she was angry with him, that she believed that he had done something wrong, and that she did not desire that he touch her. In this case I used my CSP to attribute to my friend these mental states, without even hearing any part of their conversation.

This ability to understand human behavior is crucial to the attribution of responsibility. Typically, before applying punishment, one must find that the offending person had certain sorts of mental states with regard to the harm caused (*i.e.*, *mens rea* in the legal context).[3] Before blaming one's teenage daughter for crashing the car, for example, we first determine if she was "at fault." To do this, we look to see whether she had two different sorts of mental states. First, did her *desires* (or goals) lead to her crashing the car? Second, did she *believe* that her action was likely to lead to the car crashing? (Or, *should* she have known that her action was likely to lead to the car crashing?)

The tighter the relationship between her desires and the harm, the more blame we place on her. That is, if she desired to crash the car to get back at her mother, she is deemed more deserving of blame than if she just desired to impress her friends by driving fast. Similarly, if she knew her action was going to lead to the harm caused (*e.g.*, she drove into the garage on purpose) she is more to blame than if she thought there was some remote possibility that she would crash the car (*e.g.*, because she was not paying close attention to the road).

Generally, there must be a tight relationship between a defendant's desires and the harm caused before society is willing to apply punishment. The tightest relationship occurs when someone directly desires to cause harm and acts in furtherance of that harm. This relationship is exemplified by the crime of murder. Under the Model Penal Code (MPC) §210.2,[4] one commits murder, and is subject to the most severe punishment (*i.e.*, "a felony of the first degree"),[5] if one kills another human being "purposely or knowingly."[6] This means a judge or jury finds that a defendant behaved with either the purpose of killing[7] or knowing that a death would result.[8] However, if one kills with a "reckless" state of mind—defined as a state of mind that "consciously disregards a substantial and unjustifiable risk that [the harm] will result from [one's] conduct"[9]—one commits manslaughter,[10] and is subject to a lesser punishment (*i.e.*, "a felony of the second degree"[11]). In the case of manslaughter, one is punished because she *should have known* her conduct might result in the death of another.

In sum, allocation of responsibility depends upon commonsense psychology, and more specifically, upon attribution of certain mental states characterized by a particular sort of relationship between the mental state of an individual and the harm caused by that individual.

In so far as nanotechnology may change the way desires and beliefs are produced and understood, it will impact the attribution of responsibility. Moor and Weckert identified "Privacy and Control" as one

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3 Statutory rape, however, would be one exception.
4 MODEL PENAL CODE § 210.2(1) (1962) [hereinafter MPC].
5 *Id*. at § 210.2(2).
6 *Id*. at § 210.2(1).
7 *See id*. at § 2.02 (2)(a).
8 *See* i*d.* at (2)(b).
9 *Id*. at (2)(c).
10 *See* MPC §210.3. The one exception to this is when a defendant behaves in a reckless manner "under circumstances manifesting extreme indifference to the value of human life." MPC § 210.2. In such an instance, the MPC classifies such conduct as murder as well. *Id.*
11 *Id*. at § 210.3(2).

of the three[12] primary areas of ethical concern brought forth by progress in nanotechnology.[13] This area will be the focus of the following discussion.

Concern about "Privacy and Control" includes questions regarding whether devices operating on a nanoscale can collect information traditionally made private by the boundary of human skin.[14] Additionally, there are questions about whether such devices could also be used to alter or control human behavior.[15] This latter possibility could cause problems for attribution of responsibility, particularly criminal responsibility, because if someone could control the behavior or another, then the actor directly causing criminal harm may act without criminal intent or *mens rea*.

Within the sphere of "Privacy and Control," I envision three further areas of concern where nanotechnology, particularly as used in neuroscience, may impact our ability to allocate responsibility. Nanotechnology may:

- **Provide us with new information about the mental states relevant to responsibility (*Probable*)**
- **Provide new ways to alter or inhibit the mental states relevant to responsibility (*Probable*)**
- **Provide the ability to "implant" the mental states relevant to responsibility (*Less Likely*)**

Only the last of these three possibilities presents a concern uniquely posed by nanotechnology. All three have already been envisioned and addressed by philosophers in one form or another.[16] Given the importance and seriousness of criminal punishment, however, *any* potential impact of nanotechnology on the criminal justice system should be explored prior to their realization. The purpose of this paper is to shed some light upon these areas of concern.

II. NEW INFORMATION ABOUT THE MENTAL STATES RELEVANT TO RESPONSIBILITY

People's worries about nanotechnology's impact on attribution of responsibility mirror their worries about progress in science generally. Modern science, including neuroscience and neuro-nanotechnology, presents a problem for a traditional concept of "free will." That is, some developments in science run counter to the idea that human will is only free if it falls outside the deterministic realm of physical-causal interactions. As biotechnology and neuroscience begin to explain the relationship between the brain and the mind, and new technology allows scientists to alter peoples' mental states, it has become implausible that humans are truly free to choose one amongst many options for behavior. Human behavior is directly linked to states within the nervous system, a physical system built by interaction between genes and the

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[12] The other two areas of concern are longevity and runaway technology. For more information about these two areas, *see* JAMES MOOR & JOHN WECKERT, NANOETHICS: ASSESSING THE NANOSCALE FROM AN ETHICAL POINT OF VIEW 306-7 (Davis Baird et al. eds. 2004), *available* at http://www.ifs.tu-darmstadt.de/ fileadmin/phil/nano/ moor-weckert.pdf.

[13] *See id.*

[14] *Id*. at 306.

[15] *Id*. at 305.

[16] *See e.g.*, Tomis Kapitan, *Autonomy and Manipulated Freedom*, 14 PHIL. PERSP. 81, 81-104 (2000), *available at* http://www.niu.edu/phil/~kapitan/mani.shtml; Richard Double, *Puppeteers, Hypnotists, and Neurosurgeons*, 56 PHIL. STUDIES 163, 163-173 (1989); Gerald Dworkin, *Autonomy and Behavior Control*, 6 THE HASTINGS CTR. REPORT 23, 23-28 (1976).

environment.[17] And, like any other physical system, brain states operate according to set physical causal laws.[18] There appears to be no gap in the biological/scientific explanation of behavior for free will to intervene.[19]

Some worry that if human actions are just another link in a physical-causal chain—if they are "determined"—then we can no longer attribute blame and praise. If determinism is true, and responsibility depends upon the idea that an actor "could have done otherwise," how are we to attribute responsibility and determine punishment?

As many have noted, it is a mistake to think that attribution of criminal responsibility requires one to accept the traditional notion of free will.[20] Even if a desire to kill is neurologically initiated and has a complete causal history—even if there is a fully physical explanation as to *why* that neurological sequence was initiated – the criminal justice system is designed to attribute responsibility when that desire is acted on and results in a criminally harmful act. That is, criminal responsibility does not stem from purely "uncaused," "free" action, but instead requires that people actually desired to perform the act, and desired, or at least knew, that the act would have certain consequences.

It is possible, even likely, that a future science may provide a complete physical causal description of the mental states people exhibit when they commit a murder. That is, it may be possible that science could provide a completely physical description of the *desire* to kill and the *understanding* that the act will result in a death as neurological sequence such-and-such. But such information need not affect the categories of culpability (*e.g.*, the category of murder versus manslaughter) themselves. The breadth of a category is a policy decision to be determined by legislatures and judges. New scientific knowledge should only act to help the trier of fact (*e.g.*, a jury) better categorize defendants as "guilty" or "not guilty" based upon the existing categories of culpability and defense.

III. USING NANOTECHNOLOGY TO ATTRIBUTE RESPONSIBILITY

We can now explore how nanotechnology's potential to give us new information about people's mental states, or to alter or even implant mental states, can affect how we attribute responsibility. First, if it becomes possible for nanotechnology to provide us with more accurate and specific information about people's mental states, we need not worry that such information will, on its face, negatively affect the criminal justice system. Indeed, such information should help us better apply our existing categories of culpability.

Imagine the following scenario: A defendant, John, is charged with murder for taking the life of a young boy who lived next door. Witnesses claim to have seen John hanging around the local playground multiple times during the few months preceding the murder. One witness claims he saw John talking to the boy, and walking with him back toward his house of the day of murder. John claims the boy approached him on the street and asked him if he could use his house phone to call a friend his parents did not want him speaking to. John further claims that the boy used his phone, left his house ten minutes later, and that he never saw the boy again. The boy's body was found a few miles away the following morning. He had been sexually assaulted.

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[17] One need not support strict identity between mind and body to defend this claim.

[18] *See* John J.C. Smart, *Sensations and Brain Processes*, 66 PHIL. REV. 141, 141-156 (1959); DAVID PAPINEAU, PHILOSOPHICAL NATURALISM (1993); JAEGWON KIM, SUPERVENIENCE & MIND: SELECTED PHILOSOPHICAL ESSAYS, (1993).

[19] For a recent discussion of this claim, *see* DANIEL C. DENNETT, FREEDOM EVOLVES (2004).

[20] Brain Overclaim, *Syndrome and Criminal Responsibility: A Diagnostic Note*, 3 OHIO ST. J. CRIM. L. 397, 398 (2006).

Due to a prior conviction, John was labeled a "sexual offender" and as a result he had agreed to be chemically castrated. John had also agreed to have nanotechnology (such as functionalized quantum dots[21]) implanted in his brain gathering information. Multiple quantum dots had been implanted, some in the area where the man held representations of children, others in areas indicating sexual arousal, and another few on the pathway between these two areas. If the dots ever detected simultaneous activity, this information was transmitted to John's parole officer who was then under an obligation to track John down and investigate.

In prosecuting this case, a prosecutor may need to establish motive for the boy's murder. Establishing motive (*i.e.*, a possible reason for the act) is one of the best ways to establish that the defendant *desired* to perform the criminal act. In demonstrating motive, a prosecutor may attempt to establish that John had a specific desire that could be tied to the criminal act, such as a sexual desire for the boy. In this case, nanotechnology could provide evidence that John did *not* have such a desire. This evidence would make it much more difficult for a trier of fact to find him guilty of murder.

As long as we have confidence in the veracity of the information coming from such nanotechnological devices and tools, they should be seen as a boon to the criminal justice system. Such advances can help us better categorize defendants as guilty of first or second degree murder, manslaughter, legally insane, coerced, and so on. Of course, as with other neuroscientific advances, the reliability of the data produced by nanotechnology will be an issue. Brain fingerprinting, for example, uses electroencephalography to examine memories—specifically, to see if images, such as of a weapon or a crime scene, trigger activity in a part of the brain that shows image recognition.[22] Although this technology has already been used in some criminal cases,[23] ". . . it has been criticized for problems with developing adequate test stimuli, vulnerability to countermeasures, and—because it is patented—a failure to be appropriately verified by peer review."[24] As it is also an immature science, we should expect the use of technology such as functional quantum dots to face similar difficulties in practice.[25] As the reliability of the technology increases, however, so too should our confidence in its results.

In addition, information coming from nanotechnology about people's mental states, just like information coming from any science of the mind, will pose the "translation" problem. That is, scientists will need to translate this complicated scientific evidence into commonsense terms that judges or juries can understand and consider when attributing responsibility. Often, judges and juries do not understand how new scientific data speaks to legal categories of culpability.[26] In such situations, judges need to act as informed "gatekeepers" to keep our irrelevant scientific data, and experts need to be able to "translate" scientific findings into commonsense terms for evaluation by the fact-finder.

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[21] For a review of how functional quantum dots may work, *see* Gabriel A. Silva, *Neuroscience Nanotechnology: Progress, Opportunities and Challenges*, 7 NATURE NEUROSCI. 65-74 (2006).

[22] Dean Mobbs et al., *Law, Responsibility and the Brain*, 5 PLOS BIO. 696, 693-700 (2007), *available at* http://biology.plosjournals.org/archive/1545-7885/5/4/pdf/10.1371_journal.pbio.0050103-S.pdf.

[23] *See e.g.*, Harrington v. State, 659 N.W.2d 509 (Iowa 2003).

[24] *Id*.

[25] For example, Vu et al. tagged nerve growth factor (NGF) to quantum dots and used them to promote neuronal-like differentiation in cultured pheochromocytoma 12 (PC12) cells. Ultimately, these approaches could be used to visualize and track functional responses in neurons. However, they reported that NGF conjugated to quantum dots had reduced activity compared with free NGF. For further information, *see* Tania Q. Vu et al., *Peptide-conjugated Quantum Dots Activate Neuronal Receptors and Initiate Downstream Signaling of Neurite Growth*, 5 NANO. LETTERS 603, 603–607 (2005).

[26] For a discussion of how new Brain Fingerprinting evidence may be introduced via analogy, metaphor or prototype (to the law's detriment), *see* Alexandra J. Roberts, *Everything New is Old Again: Brain Fingerprinting and Evidentiary Analogy*, 9 YALE J.L. & TECH. 234 (2007).

The Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals*[27] indicated that judges should play the role of "gatekeeper." Before *Daubert*, Federal courts used the *Frey*[28] test in determining whether to admit expert evidence. Under *Frye*, courts would allow the inclusion of any expert evidence which has "gained general acceptance in the particular field."[29] This standard could in principle keep good science out because it was not yet "generally accepted" and allow bad science in just because it was generally accepted by a small subset of scientists.[30] However, the Supreme Court's new *Daubert* test requires Federal judges to consider whether the presented data has been subject to the rigors of testing and peer review when determining the relevancy of scientific evidence.[31] The *Daubert* test also requires that the science be relevant and thus assist the fact-finder to understand the evidence or to determine a fact in issue.

Although not required to do so, some states have changed their evidentiary standard to comport with the *Daubert* test. Unfortunately, many states, including Arizona, California, Colorado, the District of Columbia, Florida, Illinois, Kansas, Maryland, Michigan, Minnesota, Mississippi, Nebraska, New Jersey, New York, Pennsylvania, and Washington still adhere to *Frye*.[32] Nonetheless, the trend seems to be toward adoption of *Daubert*.[33]

IV. PROVIDE NEW WAYS TO ALTER OR INHIBIT THE MENTAL STATES RELEVANT TO RESPONSIBILITY

Many feel that nanotechnology will eventually allow for targeted interactions with neurons and glial cells, the cells responsible for signal transmission in the brain. As explained by Armin Grunwald:

> Nanotechnology offers a range of possibilities for gathering, storing, and distributing personal data in an increasing extent. . . [Furthermore] passive observation of people could, in the distant future, be complemented by actively manipulating them—for instance, if it would be possible to gain direct technical access to their nervous system or brain. . . These possibilities are regarded by some to be not only realistic, but even certain.[34]

This means that in the above case, instead of a chemical castration, it may become possible to use nanotechnology to perform neurological castration on John. An alternative to tracking information about certain areas of the brain showing simultaneous activity may be direct inhibition of activity in certain parts of the brain (*e.g.*, within the hypothalamus), or by blocking connectivity between areas of brain.

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[27] Daubert v. Merrell Dow Pharm., 509 U.S. 579, 589 (1993) ("[U]nder the Rules the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.")

[28] Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

[29] *Id*. at 10.14.

[30] *See generally* David E. Bernstein, *Frye, Frye, Again: The Past, Present, and Future of the General Acceptance Test*, (George Mason Sch. of Law, Law & Econ., Working Paper No. 01-07), *available at* http://www.law.gmu.edu/assets/files/publications/working_papers/01-07.pdf.

[31] *Daubert* at 593 ("Another pertinent consideration [when determining whether a theory or technique is scientific] is whether the theory or technique has been subjected to peer review and publication.").

[32] Bernstein, *supra* note 30, at 2.

[33] It is true that *Daubert* places a heavy burden on judges to act as gatekeepers and to design appropriate jury instructions regarding relevance. However, this burden is shared by attorneys who can safeguard against bad judicial decisions via introduction of opposing experts, and direct- and cross-examination.

[34] Armin Grunwald, *Nanotechnology - A New Field of Ethical Inquiry?* 11 SCI. & ENG'G ETHICS 193, 187-201 (2005).

This possibility brings forward similar public policy concerns as do current practices of chemical castration. Namely, is it ethical to force personality-changing biotechnology upon criminal offenders? How reliable is this technology? Is it reliable enough to assume that such technology can provide evidence of the existence (or lack of existence) of certain mental states necessary for criminal responsibility?[35]

The use of nanotechnology, however, sharpens the focus of these questions. Chemicals used for castration, such as Depo-Provera, have potentially serious side effects, including thromboembolism, weight gain, fatigue, malaise, mild depression, hypertension, hyperglycaemia, and liver problems.[36] Moreover, to maintain the effects of Depo-Provera, a high volume of injection is required regularly. Most chemically castrated men will probably receive 400 to 500 milligrams of Depo-Provera per week, which amounts to an injection of 2.5 milliliters into each buttock each time.[37] This high volume of injections, and the subsequent side effects, may contribute to the high dropout rate seen with voluntary chemical castration. [38]

In addition, there is no guarantee that chemical castration actually works. Individuals vary in their response, and men given oral doses as high as 700 milligrams per day have still reported regular sexual arousal.[39]

One can imagine that a nanotechnological approach to castration may be more successful and have far fewer side effects than current methods. But, it may also be permanent which would be a special concern if the procedure was performed involuntarily. Let's assume, for simplicity's sake, that such operations would be voluntary, with offenders choosing to undergo them in exchange for shorter prison sentences. Under such circumstances, the principles or aims of punishment—including incapacitation, rehabilitation, and deterrence—would appear to be better accomplished via such operations than through the more traditional means of incarceration.[40]

First, such a procedure could allow for permanent incapacitation. Second, nanotechnology may allow us to embrace the latter principle of rehabilitation, a principle that has currently been cast aside due to its prohibitive cost and retributive sentiment, because, as discussed above, we could use nanotechnology to change behavior. Third, nanotechnology may allow for greater deterrent success. Instead of depending upon fickle human reasoning to select the punishments that would best deter criminal activity we can reliably deter offenders by altering their reasoning processes. Not a bad deal, assuming the nanotechnological operation would be cheaper than the current price of housing a prisoner. Currently, it costs between twenty and forty thousand dollars a year to house someone in prison.[41]

But would such technological approaches to punishment pass constitutional muster? It is hard to know for sure. Such a punishment does not appear to be crueler than current measures designed to create

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[35] For an exploration of these sorts of concerns regarding chemical castration, *see* Larry H. Spalding, *Florida's 1997 Chemical Castration Law: A Return to the Dark Ages*, 25 FLA. ST. U. L. REV. 117 (1998), *available at* http://www.law.fsu.edu/journals/lawreview/downloads/252/spalding.pdf.

[36] Karen Harrison, *The High-Risk Sex Offender Strategy in England and Wales: Is Chemical Castration an Option?* 46 HOWARD J. CRIM. JUST. 21, 16-26 (2007).

[37] Norra Macready, *Chemical Castration for Pedophiles Approved* 313 BMJ 707-708 (1996).

[38] *Id.*

[39] *Id*.

[40] It is outside the scope of this paper to discuss whether the principle of retribution would be better achieved via incapacitation or permanent neurological alteration of offenders.

[41] *See* U.S. DEPT. OF JUSTICE, BUREAU OF JUSTICE STATISTICS SPECIAL REPORT: STATE PRISON EXPENDITURES 2001 (2004), *available at* http://www.ojp.gov/bjs/pub/pdf/spe01.pdf.

the same deterrent effect, such as permanently incapacitating, imprisoning or institutionalizing, or chemically castrating an individual.[42]

Of course, alteration of sexual desires could be just the beginning of our uses of nanotechnology in crime prevention. It is possible that other offenders who exhibited a pattern of development of dangerous or violent desires would become candidates for neurological intervention via nanotechnology. One wonders whether nanotechnology could eventually be a source of what some might call an "artificial conscience," via methods similar to the government imposed chip that stopped Spike the vampire from feeding in the fabled television show, Buffy the Vampire Slayer.[43]

There are, of course, serious ethical concerns entailed by the use of neuroscientific nanotechnology as punishment. First, the "voluntary" nature of the operations needs to be considered. Are we really giving offenders a choice with regard to nanotechnological alteration if they must choose between thirty years in prison and freedom after a "simple" operation? Second, do we really want to permanently neurologically alter citizens into a certain idea of what it is to be a "good" citizen? Under the current system, persons who violate the law are allowed to remain the sort of person they are, although the space within which they are allowed to be that person is limited to a jail or prison. After they have served their time, persons are released to continue to pursue their individual desires. Alternatively, persons might be released from prison if our idea of moral standards changes and their desires are no longer deemed criminal (*e.g.*, consider what happens with political prisoners when there is a regime change.) Before permanently altering offenders based upon a societal moral code, we will need to claim that the code itself is in a sense "timeless."

A related matter is the ethical question of authority and regulation: who gets to decide which prisoners are eligible for alteration? How serious will the antisocial desires have to be to deserve alteration? Further, if state or federal legislature(s) mandates alteration of certain classes of offenders, judges and juries are still left with the task of categorizing the offenders. Such decisions can be biased, as we have seen with the historically racially-biased system of applying the death penalty.[44,45]

V. PROVIDE THE ABILITY TO "IMPLANT" THE MENTAL STATES RELEVANT TO RESPONSIBILITY

Finally, there is the possibility of nanotechnologically "implanted" desires or beliefs. First, let us consider the prospect of implanted beliefs.

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[42] The Eighth Amendment of the U.S. Constitution forbids punishments that are "cruel and unusual." As stated above, it does not seem that nanotechnological operations would be more cruel than other forms of punishment. They could be deemed "unusual" in the common language sense of the word, but probably not in the way the Supreme Court has interpreted the Constitutional term. To be "unusual" in this sense a punishment must be rare (in that it is not practiced by a majority of states) and violate "evolving standards of decency." *See* Furman v. Georgia, 408 U.S. 238, 242 (1972) ("The Eighth Amendment must draw its meaning from the evolving standards of decency that mark the progress of a maturing society.") (citing Trop v. Dulles, 365 U.S. 86 (1958).).

[43] Every time Spike attempted a violent act against humans, the "chip" caused him severe head pain preventing him from performing the act. Eventually he stopped trying to act immorally. The question posed to the characters on the show (and the viewers) were: (1) To what extent is the altered Spike different than those of us who act morally due to the inculcation of moral rules? (2) Is Spike now a "good" or "bad" guy? (3) The difference between humans and vampires was that they lacked a soul: Can we now say that Spike has a soul?

[44] *See* Charles J. Ogletree, Jr., *Black Man's Burden: Race and the Death Penalty in America*, 81 OR. L. REV. 15 (2002), *available at* http://www.law.uoregon.edu/org/olr/archives/81/81_Or_L_Rev_15.pdf.

[45] Again, note that all of these concerns apply to the current practice of chemical castration. The current procedure, however, is not as effective, or as permanent.

A person may be held less responsible for harmful behavior if his desires to commit that action are accompanied by false beliefs about the world. For example, imagine a case where a man, Fred, has been arrested for murder. Fred indeed desired to pull the trigger of his gun while his gun was aimed at the victim. However, Fred fired his gun while he was out on a bear hunt. It was early in the morning and foggy, and the 6'3" victim was walking through the forest wearing a full-length fur coat. Fred's companions also fired shots at the victim, reasonably thinking he was a bear. Fred's shots just happened to hit his target: the man wearing the fur coat.

This is a classic mistake-of-fact case under the law.[46] If Fred's false belief that his victim was a bear was indeed reasonable, we are loath to hold Fred responsible for an act of murder. Although the firing of his gun, which caused harm, was clearly linked to Fred's desires, Fred desired to kill a bear, not a human being. It is very unlikely that a judge or jury would hold Fred responsible for the killing.

Such mistaken beliefs can also lead to a successful plea for legal insanity. What is important to a claim of legal insanity is the nature and severity of the symptoms the defendant manifests at the time he commits the crime: the existence of an underlying mental illness is not sufficient.[47] The psychiatric illnesses typically associated with a successful insanity plea, such as schizophrenia and bipolar disorder, are associated with acute symptoms especially relevant to legal responsibility: delusions, hallucinations and other dissociations from self or reality.[48] These symptoms often result in false beliefs about the world, such as the belief that one is Jesus Christ and can heal others, or that the government or a neighbor is attempting to cause the defendant imminent and deadly harm. Under the *M'Naughten* test,[49] some cases of legal insanity, may be quite similar to mistake-of-fact cases, where the defendant acts on desires dependent upon such false beliefs.[50]

In sum, when desires are operating on the basis of false information, the resulting harmful behavior is sometimes legally excused. Often the difference between a mistake-of-fact defense and the insanity

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[46] *See* MPC § 2.04 (1)-(2) ("Ignorance or mistake as to a matter of fact or law is a defense if: (a) the ignorance or mistake negatives a purpose, knowledge, belief, recklessness or negligence required to establish a material element of the offense."). Some feel the defense of mistake of fact has been substantially eroded. *See* Rosanna Cavaillaro, *A Big Mistake: Eroding the Defense of Mistake of Fact About Consent in Rape*, 86 J. CRIM. L. & CRIMINOLOGY 815-859 (1996).

[47] STEPHEN GOLDING, THE ADJUDICATION OF CRIMINAL RESPONSIBILITY: A REVIEW OF THEORY AND RESEARCH 230-250 (Dorothy K. Kagehiro & William S. Laufer eds., Berlin, Springer-Verlag 1992).

[48] DIAGNOSTIC & STATISTICAL MANUAL OF MENTAL DISORDERS (1994) (The DSM-IV defines a delusion as: "A false belief based on incorrect inference about external reality that is firmly sustained despite what almost everyone else believes and despite what constitutes incontrovertible and obvious proof or evidence to the contrary. The belief is not one ordinarily accepted by other members of the person's culture or subculture (*e.g.*, it is not an article of religious faith)."); *See also* D. Blackburn, *Insanity, and Guilty but Mentally Ill: The role of the Forensic Psychiatrist*, 34 JURIS MAG. (2001).

[49] *See* M'Naghten's Case, 8 Eng. Rep. 718 (H.L. 1843) (The M'Naghten Rules, state that a person may be insane if ". . .at the time of the committing of the act, the party accused was laboring under such a defect of reason, arising from a disease of the mind, as not to know the nature and quality of the act he was doing, or, if he did know it, that he did not know what he was doing was wrong.").

[50] Some courts now add to the *M'Naughten* test the further requirement that the defendant's disease prevent him from "controlling" his conduct when the crime was committed. *See e.g.*, United States v. Lyons, 731 F.2d 243, 248 (5th Cir. 1984) ("a person is not responsible for criminal conduct on the grounds of insanity only if at the time of that conduct, as a result of a mental disease or defect, he is unable to appreciate the wrongfulness of that conduct."). Under the MPC a defendant may be deemed insane if he meets one or the other criteria: that is, if the defendant lacks substantial capacity to appreciate the wrongfulness of his conduct, or if he is not able to conform his conduct to requirements of law because of a mental disease. *See* MPC §3.06.

defense is that in the latter case, the cause of the false beliefs is internal. In a mistake of fact case, the cause of the false beliefs is external.[51]

From this analysis it should be clear that where nanotechnology allows a belief to be implanted, and when that belief is crucial to the harmful act, the actor may not be held criminally responsible. Consider the case of a woman, Mrs. Iselin, who implants within her son Raymond a belief that the President of the United States is an alien bent on destroying the country and killing all of its citizens. Because of this false belief Raymond kills the President. At his criminal trial, it would seem that Raymond could use the mistake-of-fact defense as a way to shield him from responsibility.[52]

It would be much more difficult, however, for our current legal system to handle a case where nanotechnology implants a desire. Generally, abnormal or unusual desires do not undermine attribution of responsibility, even where those desires are clearly attributable to a mental disorder.[53] Only when one's *beliefs* appear to be abnormal is responsibility lessened. To illustrate this point, take the cases of Clive and Craig. Clive was sexually abused as a child. As a result (of this and other genetic/environmental factors), he has some abnormal sexual desires, including the desire to have sex with very young boys.[54] When Clive is prosecuted for sexually assaulting his young neighbor, his lawyer will undoubtedly tell the jury the story of Clive's childhood, hoping to engender some leniency. All that is necessary to find Clive guilty of sexual assault, however, is that he acted from a desire to commit an act of sexual penetration with a person whom he knew was less than 13 years old.[55]

Craig, however, had perfectly normal sexual desires until he had the unfortunate luck of meeting a woman named Susan. They dated briefly before Craig decided to break up with her. To get her revenge, Susan abducted Craig and used nanotechnology to hyperstimulate his hypothalamus, and to connect the hypothalamus activity to a strong representation of young boys. As a result, Craig now has the desire to have sex with young boys.[56]

If Craig acted from his implanted desire, according to the current structure of the criminal law, Craig is just as responsible for his act as Clive. As stated above, the criminal law is not structured to consider the source of harmful desires: to do so would be to open a Pandora's Box of defenses to culpability.

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[51] This brings up an interesting question which must be addressed at a later point: why, then are mistake of fact defendants completely excused, and insane defendants are committed? This is due to the principle of incapacitation—mistake of fact cases are often cases where very unusual environmental circumstances cause a false belief to be generated. Insane defendants who go untreated are likely to consistently generate false beliefs and then base their behavior upon them.

[52] There is an interesting question regarding what Mrs. Iselin might be guilty of in this scenario. Categories for lesser culpability do not fit the facts. Conspiracy to commit murder requires more than one to participate in the conspiracy. Attempted murder requires that the murder plot fail. Instead, it seems Mrs. Iselin would be guilty of murder: after all, she purposely or knowingly caused the death of a human being—even though the way in which the death was caused was certainly unusual.

[53] In this piece I can only briefly speculate as to why this is so. Abnormal desires may not excuse criminal responsibility because desires exist on a sliding scale—on something like a bell curve—and beliefs are "objective." That is, judges and juries can agree about whether a belief is false, but in many cases it would be much more difficult for them to agree about which desires are "abnormal." Also, abnormal desires can lead to effective and dangerous recidivists, whereas those with defective beliefs are often ineffective offenders.

[54] For example, in a study at one prison, 57% of incarcerated incest offenders were sexually abused as children. *See* GREG OWEN & NANCY M. STEELE, INCEST OFFENDERS AFTER TREATMENT (Michael Q. Patton ed., Sage Pub. 1991).

[55] MPC § 201(b).

[56] Moor and Weckert have specifically named the possibility of manipulated pleasure centers as a likely outcome of the development of nanotechnology. *See supra* note 12.

To further illustrate this aspect of the criminal law, meet Joan. Joan has what her psychologist calls a "highly addictive" personality; she has had problems with illegal drugs her entire adult life. Joan meets Robert, a con man who learns that Joan has a large inheritance. Robert starts manipulating Joan's environment with the hopes of getting her to abuse drugs. He takes Joan to parties where he has friends approach her asking her to take drugs; he places drugs on a bathroom counter right before she enters; and eventually, he spikes something she drinks with an illegal substance. Joan starts using drugs again, and because Robert takes all her money and leaves town, she feels forced to rob a convenience store to get money to buy drugs. One could argue that Robert "implanted" the desire for illegal drugs in Joan, and that this desire led to her to rob the store. But our current criminal justice system will still hold Joan, and not Robert, guilty of robbery.

Although it is tempting to excuse Craig, who had a harmful desire implanted by way of nanotechnology, and not Clive or Joan, it is very difficult to think of a principled way to distinguish between their cases. One of the most basic tenets of the criminal law is to treat like cases like: that is, similarly situated offenders should be punished (or not) similarly.[57] If we allow Craig to use his implanted desire as a defense to culpability, why not let Joan use Robert's "implantation" of her desire as an excuse? And if we excuse Joan, why not excuse Clive, given that his desire to have sex with boys was "implanted" within him due to sexual abuse?

Nonetheless, it seems fundamentally unfair to find Craig responsible for his act. We could respond to this feeling of injustice by creating a law that desires implanted via surgery are grounds for excuse, and desires implanted via other means are not. But this response, again, seems to violate the principle of treating similar cases similarly and would surely be open to abuse by ingenious criminals.

It is important to acknowledge at this point that there are some reasons to think that it may be very difficult to use nanotechnology to implant desires. At the very least, it seems it would be more difficult to use nanotechnology to implant a desire than a belief. This is because, generally, desires are systematically reviewed and rejected based upon other competing desires. For example, if one had a desire to kill the president, and at the same time the desire not to be imprisoned for life or executed, then the desire to kill the president may be rejected. In philosophical terms, the desires to be free or stay alive may be considered "second-order" desires, or "values." These more authoritative desires—to be a certain sort of person, honest, hard-working, and certainly one who is alive—reject immediate desires to act if they violate the higher desire.[58]

The belief review process appears to be somewhat different than that of desires. Certainly, one may become confused when faced with two contrary beliefs, and may aim to reject one or the other. However, beliefs do not appear to be *systematically* reviewed and rejected in the absence of information that calls them into question. In philosophical speak, beliefs have truth conditions: they are either true or they are not; and in the absence of information to the contrary, one most often assumes they are true.[59] They need not be organized into a hierarchy to manage constant conflict between them, as is the case with desires.

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[57] *See* Griffith v. Kentucky, 479 U.S. 314, 314-15 (1987), where the Court held that after the Court has announced a new rule in the case selected for review, the integrity of judicial review requires the Court to apply that rule to all similar cases pending on direct review because selective application of a new rule violates the fundamental principle of treating similarly situated defendants the same.

[58] Indeed, it is possible that this process of policing one's desires is part of the reason why the link between desires and responsibility is so strong. Everyone has harmful desires, but they are usually kept in check by higher-order desires. When a person's review process in not operational, or when one has dangerous first-order desires, this person is likely to be dangerous in the future, and thus is a good candidate for punishment.. *See e.g.*, HARRY FRANKFURT, FREEDOM OF THE WILL AND THE CONCEPT OF PERSON (1982).

[59] For one theory of how beliefs have truth conditions, *see* Donald Davidson, *A Coherence Theory of Truth and Knowledge*, TRUTH & INTERPRETATION 307-319 (Ernest Lepore ed., Oxford, 1986).

Thus, it seems that beliefs may not undergo review as often, and implanted beliefs would be less likely to be rejected than implanted desires.

Interestingly, if it does become possible to implant desires, it may be very difficult to identify when such implantation has occurred. Because nanotechnology can be so much more precise than traditional medicinal tools, detection of its effects will be more difficult than detecting traditional medicinal tools used to alter desires, which had noticeable behavioral effects, and often altered beliefs as well.[60]

Detection of implanted beliefs, even ones implanted via nanotechnology, would be easier than detection of implanted desires, again due to the more "objective" nature of beliefs. Even in a relatively unstable personality, a new belief such as the belief that the president is an evil alien would garner attention because it is widely known to be false. However, if a person suddenly exhibited a new desire to harm the president, only close friends and family might take notice. Others might either presume that the person had good reasons for their desire, or think the person was kidding or exaggerating.

In sum, whereas beliefs are in a sense inevitably "possessed" due to certain interactions with the world (assuming normal cognitive operations), there is a strong default commonsense assumption that one "owns" their desires: that a person's desires are seen as inextricably tied to their personality or values. Maybe in part because desires are subject to ongoing review by a highly individual hierarchy of other desires, in the criminal law, offenders are responsible for their desires regardless of how they were produced. Where harmful desires are hasty and emotionally charged, such as in so-called "heat of passion" cases, offenders may be deemed *less* responsible than if the desire they acted upon was well-reasoned; but they are still to a large extent responsible for the harm caused.

If we want the criminal law to treat desires implanted via nanotechnology differently, the law will have to be changed; and changed at the expense of the principle of treating like cases alike.

VI. CONCLUSIONS

This paper discusses three ways in which neuroscientific nanotechnology may impact the attribution of responsibility: by providing new information about the mental states relevant to responsibility; by allowing us to alter or inhibit the mental state relevant to responsibility; or by allowing us to "implant" the mental states relevant to responsibility. Only the third possibility poses a new and real threat to our current system of assessing criminal responsibility.

Traditionally, offenders are held responsible for any harm related to their desires, even where the presence of a desire is due to actions or events outside the person. However, it seems unfair to hold an offender responsible for actions springing from a desire implanted via nanotechnology. If it becomes possible to implant desires, we may either: 1) determine that in such cases people are excused from responsibility, despite their similarity to cases where desires are "implanted" via other means, or 2) hold victims of implanted desires responsible even though it seems unfair.

We are forced upon one of the two horns of this dilemma by the function of law: to put people "on notice" about what sort of behavior is criminal and what is not criminal. To give citizens the option of being law-abiding, we must treat like cases alike. To avoid the possibility of conflicting legal outcomes based upon the same facts and law, legal philosophers and policy-makers need to address the possibility

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[60] For example, the street drug known as ecstasy has a strong effect on desires (*e.g.*, sexual desires), but also has side effects including nausea, hallucinations, chills, sweating, increases in body temperature, tremors, involuntary teeth clenching, muscle cramping, and blurred vision. Ecstasy users also report after-effects of anxiety, paranoia, and depression. *See* Nat'l Inst. on Drug Abuse, NIDA InfoFacts: MDMA, http://www.drugabuse.gov/Infofax/ecstasy.html (last visited April 29, 2008).

of implanted desires before a case actually arises, and to consider codifying a special exception to the general principle that one is responsible for actions springing from their desires. Expansion of the doctrine of proximate causation may also be required to hold those who implant harmful desires in others responsible.

Other possible outcomes of neuro-nanotechnology may require similar legal foresight. What is particularly interesting about the legal challenges posed by advances in new technologies, such as nanotechnology, is that solving these problems requires an interdisciplinary approach. One must first realistically understand the possibilities of new technologies and the way in which they may impact human behavior, which is no easy task. Then these possibilities must be viewed from the perspective of the goals and principles of law, and possibly, the values of society that the law is based upon.